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The Orchadian

Official Journal of the Australasian Native Orchid Society Inc.

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Thelymitra arenaria. Photo P. Collier

The Orchadian

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Editorial

Knowledge of orchids and the relationship between orchid groups is continually expanding, offering opportunities to understand them in new and better ways. DNA studies combined with a careful review of morphology and other characteristics have in recent decades resulted in changes to classification and nomenclature of major orchid groups e.g., *Cattley*a and *Oncidium* alliances. In other large groups such as *Dendrobium* and *Bulbophyllum*, new information has not led to major accepted taxonomic change.

The changes in nomenclature of large genera are not undertaken lightly, or by individual scientists, but by committees of them and others with long experience, and many with formal training in classical taxonomy. There are international committees that meet regularly to review published scientific evidence and new peer-reviewed publications. The rate of major change is determined by new evidence and is usually not frequent in the short term in orchid science.

A consistent approach must be taken across all orchid genera, not taking genera or species in isolation. An example is the consensus view that was taken across all orchid genera in *Genera Orchidacearum* (2000-14), a series of six large, detailed publications written after collaboration and review by more than 120 appropriately qualified people. Some growers have a passion for a particular genus, but their strong opinions about alternative nomenclature are not a part of the international consensus view, which provides the protocol for using classifications in most publications, including *The Orchadian*.

The number of species in a genus may vary from one species (e.g., the monotypic *Rhinerrhiza divitiflora*) to more than 1000 (e.g., *Bulbophyllum*, *Dendrobium*). Evidence for difference and natural groupings is the basis for differentiation, rather

than the actual number of species in a genus. The only difference between *Bulbophyllum* and *Dendrobium*, when all species are considered, is the point of origin of the floral racemes (*Genera Orchidacearum* Vol. 6). There is a history of several species in each of these two genera being classified in the other genus. In large groups, species may be further classified into sections, with the conservation of existing names.

In this issue, André Schuiteman, Research Leader at Kew Gardens, UK, explains the options and reasoning for a major change, where *Dendrochilum* has become part of the genus *Coelogyne*. His account is very clear and understandable and indicates that the issues are complex and require a specialised and consensus approach to decision-making. Both genera occur in New Guinea, which is ANOS territory, but not in Australia. *Pholidota pallida,* which occurs in northern Australia, has become part of *Coelogyne*.

There is a floral size difference between *Coelogyne* and *Dendrochilum*, the latter having much smaller flowers, but the flowers have very close affinities in other characteristics, and DNA studies confirm their close relationship. In the future, *Dendrochilum* may become a section of *Coelogyne*, thus conserving the name. The change has been accepted internationally, for example on Plants of the World Online and the World Checklist of Selected Plant Families (WCSPF), an earlier list.

Harry Ashton writes about *Thelymitra apiculata*, one of the most iconic and brilliantly coloured Australian orchids which grows in a very harsh dry habitat in Western Australia. Robin Garnett and Phil Collier describe their meticulous study of the Tasmanian sun orchid, *Thelymitra arenaria,* which prefers a wetter habitat. Complex data from studies like these will assist in the conservation of species that can easily be lost through poor land management. Leo Davis describes attempts to better understand the frequency of *Caleana disjuncta* in a conservation park south of Adelaide. He found very variable plant numbers in different seasons and increased numbers over what was previously known.

It is heartening to be able to provide show reports which have returned to our journal, and I thank the writers for their important contributions. The resumption of shows has been most welcome and generated renewed enthusiasm across the country.

The show reports reflect a good flowering in 2022 in many parts of Australia, particularly of *Dendrobium speciosum*. *Dendrobium kingianum* and *Sarcochilus* flower later in the season and should be covered in show reports in the December issue. *The Orchadian* welcomes reports from group members on shows and orchid collections. Anyone who visits a show is encouraged to write an account of the Australian and Australasian orchids exhibited. For an article, all a writer needs to do is to assemble a minimum of 700 words (one page) and 6-8 high quality photographs which will form a two or more-page report for publication.

On a sad note, I record the recent passing of Ted Gregory, after a long and successful association with Australian orchids. Some of his work, undertaken with his wife Barbara, is celebrated in *The Orchadian* 20 (4) in two invited articles: *The History of Merrellen Orchids* by daughters Ellen and Merril (p. 161), and *The Orchid Breeding Program of Merrellen Orchids*, by Peter Adams and Sheryl Lawson (p. 164).

Peter Adams

President's Report

In mid-2021, more than a year into the COVID-19 pandemic, there were concerns that some ANOS groups and/or associated native orchid societies might decline and fold. At this time, there were limited numbers of monthly meetings and very limited, if any, closed displays and shows, open shows and ANOS award judging events. Some groups had commenced online meetings to maintain the interest of members. Virtual events require a degree of computer knowledge or someone to assist and some members could not participate in this way. Some groups were able to hold in person monthly meetings but attendance was reduced. This may have been because more of the long term members were understandably concerned about contracting the virus.

By early 2022 shows and ANOS award judging events had not recommenced to any significant extent. Other awarding organisations had moved to virtual award judging using photographs and information about plants. Under exceptional circumstances, the ANOS award system allows for a minimum of three judges to judge the exhibit together, with the remainder of the minimum of five judges (i.e. at least two more judges) considering pictures, information and discussion by the judges who had seen the exhibit. Attendance at monthly meetings had grown slightly, however, a lot of long term members had not returned to meetings. From around April 2022, this has changed. My report in the June 2022 issue of *The Orchadian* mentioned four shows that occurred in April and May 2022 and five awards that had been conferred.

There have been at least a further fifteen shows held by groups and associated native orchid societies during August and September 2022. This includes two in Queensland, Brisbane and surrounds and Toowoomba, nine in New South Wales, from Illawarra and Macarthur in the south to Far North Coast in the north, one in Victoria, one in South Australia and two in Western Australia.

The Kabi Group filled thirty tables and a large hanging frame with exhibits at their August 2022 show. The last time the Kabi Group held an August show was in 2018. This show was not held in 2019 as it clashed with the 2019 Conference and Show which the Kabi Group assisted ANOS in organising. The Far North Coast Group held its first show since late August 2019 in late August 2022 and was very pleased with the exhibits benched and the public attendance. The Native Orchid Society of Toowoomba Inc. (NOSTI) show is held in late September during the Toowoomba Carnival of Flowers celebrations and had benches full of exhibits. This was probably the most plants benched in the last five years.

There are at least six more shows planned in New South Wales, one in Victoria (Geelong) and one in WA (Perth) in October and November 2022. These shows will provide an opportunity for members to view exhibits, purchase plants and engage with likeminded enthusiasts.

The flow of awards has resumed during August and September 2022 with judges officiating at shows again. I understand there could be at least twenty-one awards conferred in this two month period. As can be seen, there has been a reassuringly strong resurgence of ANOS activities with much benching and renewed interest in growing, exhibiting and gatherings to look at and discuss orchids. The COVID-19 hiatus does not appear to have resulted in the feared setback.

I encourage members to use the current wave of enthusiasm to get back to attending group meetings and shows subject to feeling safe from the continuing risk of COVID-19 and other infections.

David James

Why Was *Coelogyne* Expanded, or, What Happened to *Dendrochilum*?

Text by André Schuiteman | A.Schuiteman@kew.org

Summary

Dendrochilum and *Pholidota* have recently been reclassified as part of the genus *Coelogyne*, meaning they are now considered as *Coelogyne* species. All three genera occur in New Guinea, and there is a species of *Pholidota* in northern Australia. DNA and morphological studies form the basis for the change. Classification of orchid genera should be consistent across the whole family, and this revision is in line with previous changes to key genera such as *Dendrobium* and *Cattleya*.

Introduction

There are six species of *Coelogyne* and one of *Dendrochilum* in New Guinea. Recently, Chase et al. (2021) have reviewed the relationships between these two relatively large genera, and *Dendrochilum* has become part of *Coelogyne*. The change is significant, and this paper explains the reasons for the decision.

What is a genus? That is the question that must be answered before we can explain what happened to *Coelogyne*, or rather, what happened to *Dendrochilum*. It is best to start the explanation with another well-known example. Take the genus *Cattleya*. The first *Cattleya* to be described was *Cattleya labiata* Lindl. Many species have been added since. What exactly is a *Cattleya*? A reasonable guess is that everything that looks like *C. labiata* is a *Cattleya*. This means that it should have large, floppy, pinkish-purple flowers with broad petals and a trumpet-shaped lip.

Let's look at some orchids that others have already labelled for us. *Cattleya mossiae* C.Parker ex Hook.? Yes, that looks almost the same, so it must be a *Cattleya*. *Cattleya maxima* Lindl.? *Cattleya skinneri* Bateman? *Cattleya dowiana* Bateman & Rchb.f.? That is a pass on all three. The last has yellow sepals and petals but otherwise, it seems to fit. We make a note that cattleyas can have yellow flowers too. *Cattleya iricolor* Rchb.f.? That's a tricky one: the petals are as narrow as the sepals, but the lip and the plant habit still seem to fit. Pass. *Laelia purpurata* Lindl. & Paxton? The flower looks similar enough but when we get our hand lens out, we see that it has eight pollinia, not four, like all other cattleyas so far. Let's make it a rule that a genus can only have one fixed number of pollinia. In that case, we're going to reject *L. purpurata*. Next! *Sophronitis cernua* (Lindl.) Lindl.? This one is so different from *C. labiata* that it is clearly not in the same genus. It has small, orange-red flowers, a lip that is not trumpet-shaped, petals that are hardly broader than the sepals, and it is a totally different, diminutive plant. It doesn't look remotely like *C. labiata*. Besides, it has eight pollinia. Reject!

That was easy, wasn't it? We could continue looking at candidates and let them pass or be rejected one by one. In this way, we end up with the genus *Cattleya*. This is roughly the way botanists until recently decided which species should go into the same genus. Sometimes, as we just saw, they invented rules such as 'all species in an orchid genus must have the same number of pollinia' or 'species with a spurred lip and those without a spur cannot belong to the same genus'. What, then, is a genus? Traditionally, a genus was a group of species that shared a combination of characters that set them apart from other genera. At the same time, botanists also wanted genera to be 'natural groups', which after Darwin meant that the species in the genus must be more closely related to each other than to other species outside the genus. Even before Darwin published his Theory of Evolution, botanists already liked to refer to 'natural groups', but at that time it meant something like 'groups that shared many traits' rather than groups of related species.

A 'genus' made up of all plant species with blue flowers may have a character that sets them apart from all others, namely the blue colour, but it is clearly not a natural group because the species in it are not each other's nearest relatives. A blue gentian is more closely related to a yellow gentian than to a cornflower (*Centaurea cyanus* L.).

How can we tell if the species in a genus form a natural group? Before we had the luxury of DNA analyses all we could do was study the traits (characters) of the species carefully. Species that are closely related will have inherited many of the visible ('morphological') characters from their nearest ancestors, which explains why they tend to be similar. On the other hand, during evolution, new characters may arise within a genus; that's why we have yellow and purple cattleyas, as well as cattleyas with broad and narrow petals, and with one or two leaves per pseudobulb. In the end, there may be only a few characters that all species in a genus have in common. A careful study of the patterns formed by the characters will show that these species are linked. This was the thinking behind traditional genera.

Unfortunately, visible characters can be misleading, and rules can be broken. If the same character, let's say, 'petals being much broader than the sepals', arises more than once during evolutionary history, then having broad petals does not automatically indicate that the species are closely related. There are then at least two distinct groups with broad petals. We call this convergent evolution, which means that the same trait evolved at least twice independently (think of the spiny columns of cacti and euphorbias).

What may also happen is that the usual characters of a genus are modified and replaced by others, so we end up with a species that is a member of the genus but no longer looks like one. At least, not at first sight. We can call these changes of characters 'character transformations'. Usually, they can be explained by natural selection (following Darwin again). For example, if, within a genus, certain species became adapted to a new kind of pollinator, the flowers may have evolved to become quite different from the rest. In a genus where the flowers are normally bee-pollinated, some species may have become adapted to hummingbird pollination, and as a result, the flowers in those species will look different in shape and colour.

What botanists have done time and again is to put such different-looking members of a genus in separate genera, as we will soon see when we return to *Cattleya* and *Coelogyne*.

DNA Studies

First, let's observe how DNA analysis has changed the way we approach genera. DNA, the carrier of genetic information, is essentially a very long string of pairs of letters (typically around a billion long in orchids), using four different nucleotides: cytosine, guanine, adenosine and thymine (forming the letters C, G, A, and T). It is passed from parent to offspring and therefore also from ancestor to descendants. Because of mutations, the letters in a string of DNA will differ between ancestor and descendants; and generally, the more steps (generations, species) are in between, the greater the differences will be.

We need to be a bit more precise when we say that a genus must be a natural group. A natural group is a group of species such that all are descendants from the same ancestor, and no other species are descendants from this ancestor. To state this with fewer words, we say that a natural group is a monophyletic group. Therefore, a genus is a monophyletic group. This definition is a little too broad, however, because not every monophyletic group is a genus, but every genus is (or should be) a monophyletic group. We'll come back to that. The beauty of DNA analysis is that it can usually tell us quite accurately how species are related, just by analysing the differences between those strings of letters, and it can therefore tell us which groups are monophyletic. That is a big help when we want to know which species form a natural group that we can call a genus.

Going back to *Cattleya*, what have we learned from DNA analyses (see Van den Berg, 2014)? That botanists got many things wrong! They were on the one hand misled by convergent evolution and on the other hand by character transformations. Convergent evolution made them believe that *Cattleya skinneri* was closely related to *C. labiata*. It is more closely related to

Guarianthe skinneri (was *Cattleya skinneri*).
Photo H. Oakeley.

Cattleya cernua (was *Sophronitis cernua*).
Photo H. Oakeley.

Laelia anceps. Photo H. Oakeley.

Cattleya purpurata (was *Laelia purpurata*).
Photo A. Schuiteman.

Cattleya labiata. Photo H. Oakeley.

Coelogyne cristata. Photo A. Schuiteman.

Coelogyne schultesii. Photo A. Schuiteman.

Coelogyne blumea (was *Nabaluia angustifolia*). Photo A. Schuiteman.

Coelogyne eduardii (was *Chelonistele devogelii*). Photo A. Schuiteman.

Coelogyne articulata (was *Pholidota articulata*). Photo A. Schuiteman.

Coelogyne linearifolia (was *Dendrochilum linearifolium*) .Photo A. Schuiteman.

Coelogyne tenella (was *Dendrochilum tenellum*). Photo A. Schuiteman

Rhyncholaelia and *Brassavola* and therefore it is now placed in a different genus, *Guarianthe*. Character transformations made us believe that *Sophronitis cernua* was only distantly related to *C. labiata*, but it is one of a small number of cattleyas that are adapted to hummingbird pollination and as a result look surprisingly different (bright orange/red flowers, a small labellum). Botanists used to combine them in the genus *Sophronitis*. DNA tells us that *Sophronitis cernua* falls within *Cattleya* but that it is not closely related to *S. coccinea* (Lindl.) Rchb.f., which also falls within *Cattleya,* and indeed was first described as a *Cattleya*! All Brazilian *Laelia* species, even though they have eight instead of four pollinia, also fall within *Cattleya*, and *C. maxima* is more closely related to them than to *C. labiata.*

As a result of these studies, *Cattleya* was expanded to contain *Sophronitis* and a large part of *Laelia. Laelia sensu stricto* still exists but hails mainly from Mexico and Central America, for example, *L. anceps* Lindl. The Brazilian and Central American laelias were lumped in the past because both have eight pollinia, but they do not form a natural group.

Options for Revision of *Coelogyne* and *Dendrochilum*

At last, we come to *Coelogyne*. This genus, like *Cattleya*, has also been expanded (see Chase et al., 2021). What has happened here is that a whole range of genera that were traditionally considered to be closely related to *Coelogyne* have now been merged with it. DNA studies by Barbara Gravendeel and others found that *Coelogyne*, as traditionally delimited, was not a monophyletic group but was split into two main branches, with all the other related genera also to be found nested in one or the other of these two branches. For example, *Coelogyne cristata* Lindl. is more closely related to *Pholidota imbricata* Hook. than to *C. pandurata* Lindl., and *C. pandurata* is more closely related to *Dendrochilum longifolium* Rchb.f. than to *C. cristata.* If we want to have natural, that is, monophyletic, genera, then the *Coelogyne* problem could only be resolved in one of three ways: (1). Consider each of the two main branches as a separate genus, of which only one would be called *Coelogyne*; (2). Keep most of the existing genera but split up *Coelogyne* into several smaller genera; (3). Merge everything in the two branches into one big genus, which can still be called *Coelogyne*. Option 2 could be called the splitting option, and option 3 the lumping option.

At this point, we can see that being monophyletic is not the only criterion that we need when we are trying to define genera. Here we have three different options that all result in monophyletic groups. How do we choose between them? The DNA data don't help us any further because all options are equally well supported by the data, and the lengths of the branches do not give us an obvious way to choose either (a technical point which I will not elaborate on). Now is the time to go back to the characters of the plants. If besides genera being monophyletic, we demand that they must be visually recognisable, then we can at least eliminate some options, and ideally end up with only one.

In the case of *Coelogyne*, option (1) would have resulted in two big genera that nobody could recognise. There is no combination of visible characters that would separate the two. This eliminates option (1). Option (2) would necessitate several new genera being split off from *Coelogyne*, and these would be difficult to identify. That last point should not be surprising; it is not for nothing that they were traditionally included in the genus *Coelogyne*. In addition, many well-known *Coelogyne* species would have to be removed from *Coelogyne*, such as *C. pandurata* and *C. pulverula* Teijsm. & Binn. Another consideration is that once you start splitting, there is always a possibility to split even more. Each of the 22 sections of *Coelogyne* could end up as a different genus. It is important to note that there would not be one unique way to implement option (2), but many ways. Who can tell which one is the best?

That leaves option (3). This would result in one big (c. 550 species) genus that almost anyone could recognise because the only closely related and similar genus would be *Pleione*, which is distinguished by its annual pseudobulbs and consequent lack of a persistent rhizome. Therefore, we now have an expanded version of *Coelogyne* that is both monophyletic and easily recognisable. Unfortunately, this option has drawbacks too. It

led to the loss of about 14 genera, and their species had to be renamed under *Coelogyne*, although many already had names in that genus.

Not many amateurs will be distressed by the loss of *Bulleya*, *Nabaluia*, or *Geesinkorchis*. Even the loss of *Chelonistele* and *Pholidota*, two of the better-known former genera, is probably something they could overcome. But there is one change that for many will be a bridge too far: *Dendrochilum* has become part of *Coelogyne*. With 280 species, *Dendrochilum* is even larger than *Coelogyne* itself (200 species prior to expansion), but *Coelogyne* is the older name and therefore must be used. Why can't we keep at least *Dendrochilum*? Anyone can see that a *Dendrochilum* is different from a *Coelogyne*, right?

Dendrochilum

We must include *Dendrochilum* in *Coelogyne* for the same reason as why we must include *Sophronitis* in *Cattleya*. If we exclude *Dendrochilum*, then the remaining species in *Coelogyne* no longer form a monophyletic group. And the moment we start admitting genera that are not monophyletic we will inevitably return to the dark ages from before we had DNA evidence. After all, if we take out *Dendrochilum*, then why not take out *Pholidota*, *Chelonistele*, or *Nabaluia* as well? Soon, we would be back to square one, with a 'genus' *Coelogyne* that makes no sense. A genus of leftovers.

Still, it is worthwhile to ask why *Dendrochilum* seems so different from most of the other species of *Coelogyne*. It turns out that the only real difference is the consistently smaller size of the flowers in *Dendrochilum*, and this, in turn, relates to the fact that, as far as we know, *Dendrochilum* is pollinated by small flies, whereas *Coelogyne* is pollinated by wasps and bees. The situation thus resembles what we have seen in *Cattleya* with the former genus *Sophronitis,* where a pollinator shift has brought about some radical morphological changes. The main differences are that *Dendrochilum* is a monophyletic group, which *Sophronitis* in the traditional sense is not, and that *Dendrochilum* has far more species.

The example of *Dendrochilum* shows that not every monophyletic group must be a genus, even if it is easily recognisable. In fact, every genus that is not very small is made up of numerous monophyletic subgroups. We can always split genera into smaller ones. Some botanists (the extreme splitters) believe that it is best to have lots of small genera, which only contain species that are very much alike. I would say that this is missing the point of having genera in the first place. Genera inform us which species are closely related, and this tells us a lot about those species. Genera let us predict what kind of properties we could expect to find among their species, for example, genetic compatibility (important for hybridizers). If we focus too much on a handful of visible traits, we may overlook many other characters that species have in common, which they owe to the unique evolutionary history that shaped each genus. Membership of a genus tells us that two species are closely related, even if they may look as different as *Cattleya labiata* and *C.* (formerly *Sophronitis*) *cernua* (Lindl.) Van den Berg or *Coelogyne cristata* and *C.* (formerly *Dendrochilum*) *tenella* (Nees & Meyen) M.W.Chase & Schuit. The products of evolution make us realise once more the truth of the saying that looks can be deceptive.

As already mentioned, *Coelogyne* used to be divided into 22 named groups called sections (Clayton, 2002; George & George, 2011). Most of the genera now added to it will likely become new sections of *Coelogyne*. For now, there is not enough information to turn this suggestion into a formal classification. This is because sections, like genera, should also be monophyletic groups. It is not yet certain that this would be the case if we simply reduced the former genera to sections of *Coelogyne*. However, it is highly likely that *Dendrochilum* will end up as a section of *Coelogyne* and in this way will continue to exist as a named group that botanists and hobbyists alike can refer to as 'dendrochilums'.

Implications for New Guinean and Australian species

New Guinea is remarkably poor in members of the genus *Coelogyne*, expanded or not. Apart from six species of *Coelogyne* in the old sense,

there are just one species of *Dendrochilum* and three of *Pholidota*. Australia has even fewer representatives: only *Pholidota imbricata* has been recorded. The new names in *Coelogyne* are:

Dendrochilum longifolium Rchb.f. = *Coelogyne bracteosa* (Rchb.f.) M.W.Chase & Schuit.

Pholidota carnea (Blume) Lindl. = *Coelogyne carnea* (Blume) Rchb.f.

Pholidota imbricata Hook. = *Coelogyne imbricata* (Hook.) Rchb.f.

Pholidota ventricosa (Blume) Rchb.f. = *Coelogyne ventricosa* (Blume) Rchb.f.

Andre Schuiteman is Research Leader at the Royal Botanic Gardens, Kew. He has special interests in the systematics, biogeography, evolution and conservation of orchids of southeast Asia and New Guinea.

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Finding a Needle in the Outback: *Thelymitra apiculata* (A.S.George) M.A.Clem. & D.L.Jones

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Introduction

Many orchid enthusiasts enjoy a nice break over summer. Few cultivated orchids are in flower, and orchid society activity is low. In Western Australia, we share this period of dormancy with our native terrestrial orchids - summer here is hot, dry and unequivocally uncomfortable. The appeal of hibernating underground isn't lost on me, and I am always keen to welcome cooler temperatures and first rains. The pleasant change in conditions provides the impetus to start bush-walks and catch up on all the exercise I was too lazy to do in summer. One of the first Western Australian orchids to emerge is *Thelymitra apiculata*, commonly known as Cleopatra's Needles, and this is definitely a favorite of mine. Both *T. apiculata* and closely related *T. variegata* (Lindl.) are intensely coloured terrestrial orchids which are endemic to the southwest corner of Western Australia and arguably have the most striking colour combinations that rival any species orchid in the world.

The Plant and Its' Names

The species epithet originates from the Latin *apiculātum*, describing a structure ending in a sharp point, which refers to the flower's distinct 'needles' on the erect column lobes. I've never understood the common name's reference to Cleopatra- perhaps the royal reference is to her appreciably more popular cousin, *Thelymitra variegata,* known as the Queen of Sheba. An earlier name was *T. variegata* var. *apiculata* A.S.George (1984).

Thelymitra apiculata shares a common name with a pair of ancient Egyptian obelisks that were re-erected in London and New York in the late 19th century. The 'needles' weigh over 200 tonnes, and so transportation by sea at the time was an engineering challenge. The journey from Egypt to London was particularly complicated, with a number of sailors drowning in a storm in the process. Despite the tragedy, the needle survived the journey to London undamaged, where it was winched into the current position on the embankment of the river Thames in 1878. The names of the sailors who passed away are commemorated on a plaque at the base of the obelisk. Much like *Thelymitra apiculata*, the obelisks have little to do with Queen Cleopatra, having been constructed over 1000 years before her birth.

Thelymitra apiculata and *T. variegata* have leaves up to 10 cm long x 10 mm wide, either erect or spirally twisted. Flower stems are up to 40 cm tall, and the flowers are highly coloured and iridescent, in shades of red, yellow, orange, pink, purple and violet. *Thelymitra apiculata* can have golden margins and a deeper purple, and yellow column lobes about 1 mm long. It tends to flower earlier than *T. variegata*.

The species grows north of Perth, on laterite hilltops between Gingin and Eneabba. The landscape is particularly harsh, even by Western Australian standards, and the gravelly terrain supports low shrubland. Being a sun orchid, the flowers only open on warm, sunny days, which are not frequent during the June-July blooming period.

It's not uncommon to be excited by a flash of purple, only to realise you've fallen victim to floral mimicry exhibited by *Calectasia* species known as tinsel flowers. Such mimicry is thought to assist with pollination and reproduction of the species. My ability to differentiate them at a distance certainly isn't much better than a potential pollinator.

Thelymitra apiculata. Photo A. Matt.

Thelymitra apiculata. Photo A. Matt.

Thelymitra apiculata. Photo B. Castlehow.

Thelymitra apiculata. Photo B. Castlehow.

Habitat of *Thelymitra apiculata*. Photo H. Ashton.

Habitat of *Thelymitra apiculata*. Photo A. Matt.

Thelymitra apiculata. Photo H. Ashton.

Thelymitra apiculata in habitat . Photo B. Castlehow.

The species was 'formally' discovered in 1965 by children of Mogumber Primary School, which at the time was part of the Mogumber Methodist Mission. The mission has ties to the Stolen Generation and housed Aboriginal children as part of the Western Australian Government's assimilation policies. Part of the region's long history of racial oppression and harsh landscape was featured in the 2002 award winning film *Rabbit-Proof Fence*. The flowering period of *Thelymitra apiculata* commences with National Sorry Day and concludes with NAIDOC Week. Having witnessed decades of racial injustice from the hilltops overlooking Mogumber, perhaps this is not a coincidence, and offers us an opportunity to reflect on mistakes of the past.

Harry Ashton is passionate about promoting the interest, culture and conservation of native orchid species. He is President of ANOS WA, an ANOS Inc. council member, and secretary of the Orchid Society of Western Australia.

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Thelymitra arenaria Lindl.: The Movie

Robin Garnett and Phil Collier | phil.a.collier@outlook.com

Summary

Using longitudinal monitoring data, three quantitative models were created that specify how an "average" *Thelymitra arenaria* raceme and its flowers develop over time. Peak flowering progresses along the raceme with a latency of about 2 days between successive flowers. Individual flowers are successively smaller along the raceme and sepals reach their maximum size at peak flowering and just after, while ovaries expand until about 10 days after peak flowering. Scaled illustrations derived from these models are snapshots from a movie of flowering over time.

These models have implications for people who undertake demographic monitoring of orchid populations. When specific measurements of flower characters are required but not made on an ideal day, the models may help to calculate a best-available surrogate value. This information may also be useful for readers of taxonomic descriptions, who will be better informed about the dynamics of raceme development when comparing the published literature against samples from the field.

Introduction

Orchid plants can be seen from many perspectives including *ex-situ* studies of phylogeny or taxonomy and *in situ* still-life images or ecological research. Measurement is an important aspect of some of these activities. The taxonomic literature, e.g., Jeanes (2004, 2013), provides many measurements of plants and their parts. These measurements are typically cross-sectional (from different plants at one point in time) that can be repeated in the lab using preserved specimens. Meanwhile, an ecologist may be interested in longitudinal field measurements, repeated periodically from the same plants e.g., Cropper et. al (1989), Collier & Garnett (2014).

The inspiration for this paper comes from a long-term study of orchid demographics, at Rubicon Sanctuary, a protected area in northern Tasmania, which aimed to determine how a program of disturbance interacts with the emergence, vigour and flowering of the plants.

Several measurements were chosen as proxies for plant vigour, including the number of flowers on a raceme and the size of an open flower; the latter is operationalised as ovary length and sepal length at "peak" flowering. The Australian sun-orchids, *Thelymitra* spp., are notorious for opening fully only on warm, humid and/or still days, which are rare at Rubicon Sanctuary, but it is generally possible to discern when flowers are ready to open.

Measurements should ideally be standardised, for example, by observing the lowest flower in a raceme when it is open, or ready to open. This can be difficult to achieve because human labour may be stretched or unavailable, and measurement may be from a flower shortly before or after peak flowering, or from an "open" flower further along the raceme. How do the measurements of flower parts vary over time, especially on the days on either side of peak flowering; and does flower size vary systematically along a raceme?

Using data from two consecutive flowering seasons, we constructed three models that describe the dynamics of an "average" plant. These models answer the questions above and specify a movie of the seasonal development of a flowering raceme.

Methods

We selected a relatively common species, *T. arenaria* (Fig. 1) that grows in a sandy habitat at

Rubicon Sanctuary. We identified plants that were broadly representative of the wider population and reasonably accessible. These plants were caged to minimise losses due to mammal grazing and monitored regularly during the flowering season.

On each monitoring visit, a steel ruler with 0.5 mm divisions was used to measure the sepal and ovary length of every flower in each raceme. Each flower was recorded as being in bud (immature), open (or ready to open) or developing its capsule (gone over). Anything unexpected was recorded as an optional note.

Data was collected on 27 days in 2017 and 15 days in 2018 during the flowering season and periodically thereafter until most of the capsules were fully developed. New data sheets were used on each monitoring visit.

Data was subsequently transcribed into a spreadsheet. Code written using the R package (www.r-project.org) was used to output the data in a format where the time sequence for each plant and flower could be visually examined, to identify outliers, and reset outlying values to be "not available".

Figure 1. *Thelymitra arenaria*, showing a robust raceme with flowers open. Photo R. Collier

We derived an estimate of how long the average flower is open using the monitoring data. This gives a value of between three and four days. For this modelling, we assumed that the average flower is open, or could be open in favourable conditions for three days. A priority was to establish the day of peak flowering for each flower. This was defined as one day before "flower (ready to) open" is recorded immediately followed by "capsule" on the next day, which is consistent with our modelling assumption above.

The usefulness of data was next examined by considering the data sequences for each flower. In particular, all sequences that lacked an unambiguous signal of peak flowering were marked as unusable.

The lengths of the sepal and ovary of a flower are key measurements at the time of peak flowering. We calculated these measurements by the mean of all available measurements between 3 days prior to and 1 day after peak flowering, a maximum of five measurements. This, in part, serves also to smooth variations in the daily measurements.

To create a model of development for the "average" flower, we worked with normalised (or relative) lengths of the sepal and ovary. Details of this method are provided in the Appendix.

For each normalised observation of a sepal and ovary, we computed the number of days before or after peak flowering by subtracting the day of peak flowering from the day of observation. Negative values denote the number of days before peak flowering.

In common with many orchid species, the flowers in a *T. arenaria* raceme open in sequence up the flower spike. Flower positions are numbered sequentially along the raceme from the lowest to the top flower, with flower position one being the lowest. We calculate the number of days between successive peak flowering events along the

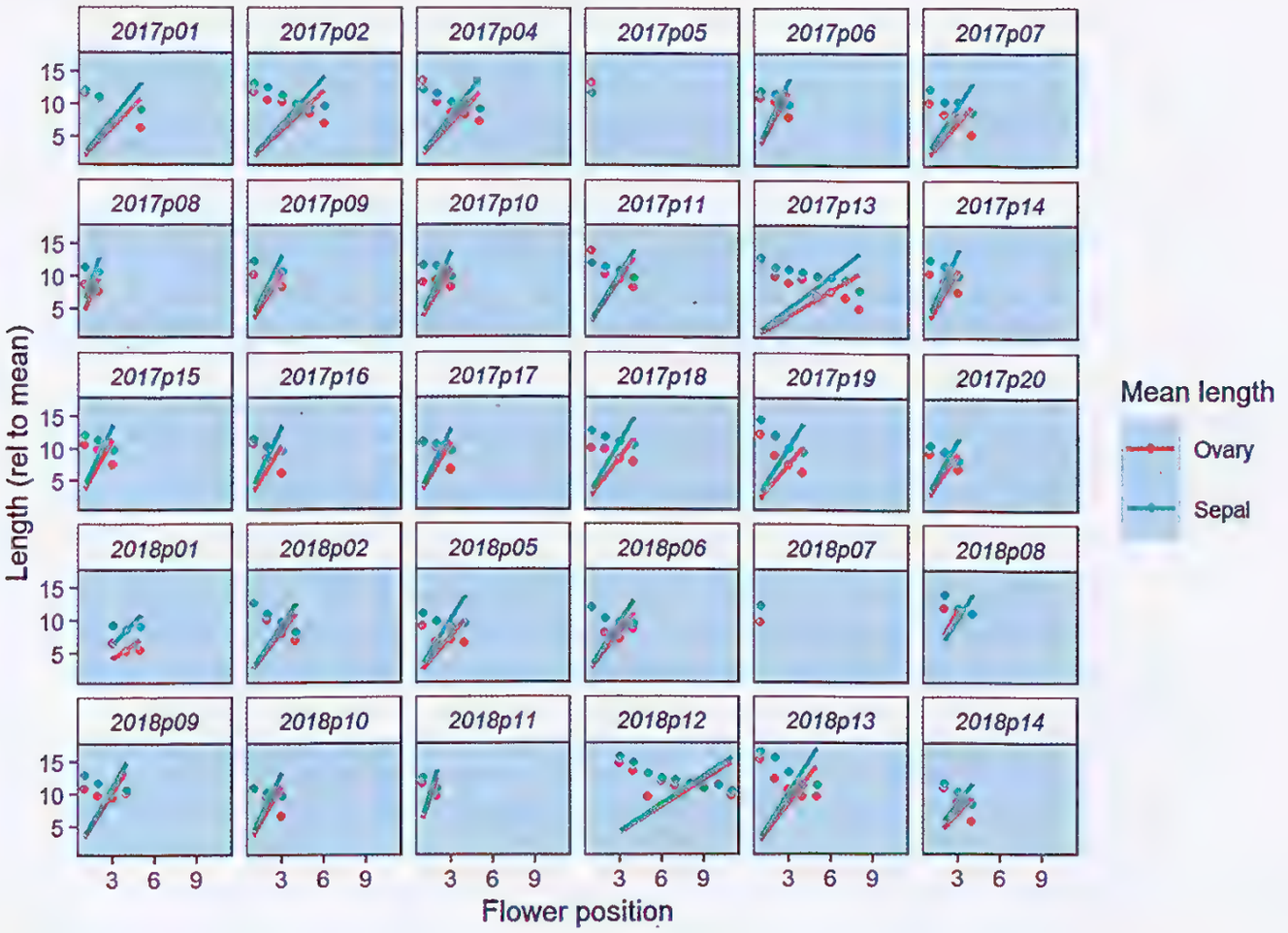


Figure 2. For each flower on each plant (2017pxx or 2018pxx) the means of usable ovary and sepal lengths and a line of best fit, computed using stats::lm in R.

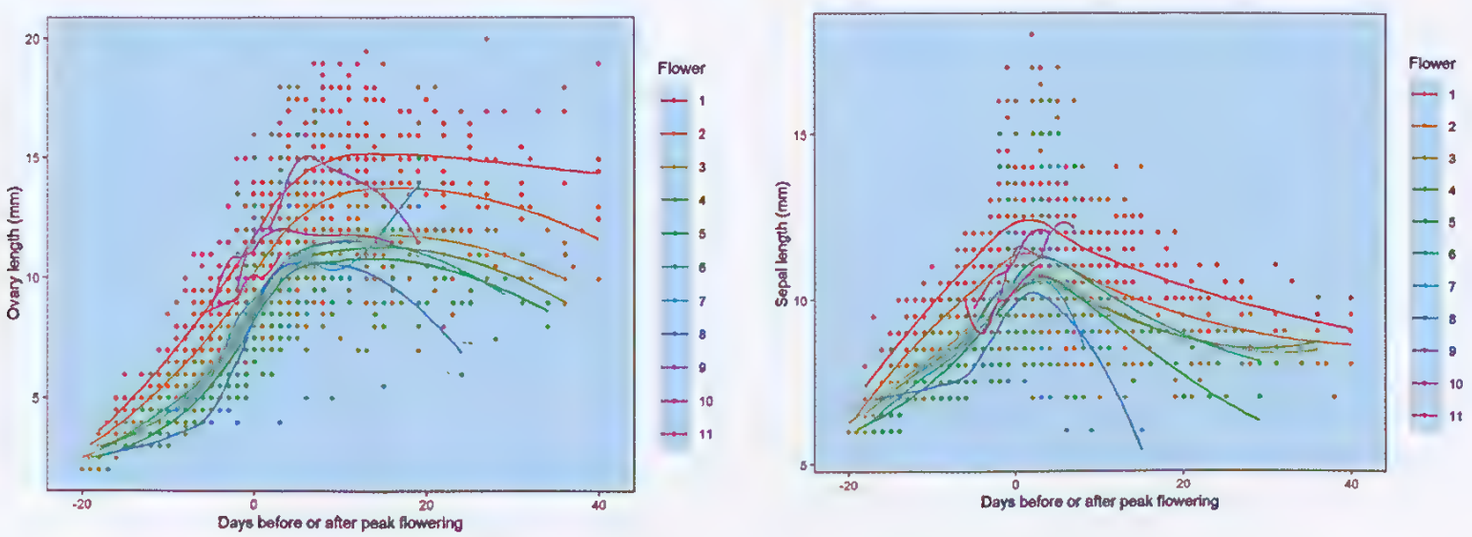


Figure 3. A non-parametric local polynomial regression (using loess in R) fitted to the usable measurements of ovary (left) and sepal (right) lengths, aggregated by flower position.

Year	States		Ovary length		Sepal length	
	Recorded	Usable	Recorded	Usable	Recorded	Usable
2017	1751	1664	1726	1385	1726	1460
2018	800	532	772	431	736	451
Total	2551	2196	2498	1816	2462	1911

Table 1. Recorded and usable flowering (bud, open, or fruit) states and measured lengths of ovaries and sepals.

raceme. We used this data to model the opening schedule of successive flowers along the raceme.

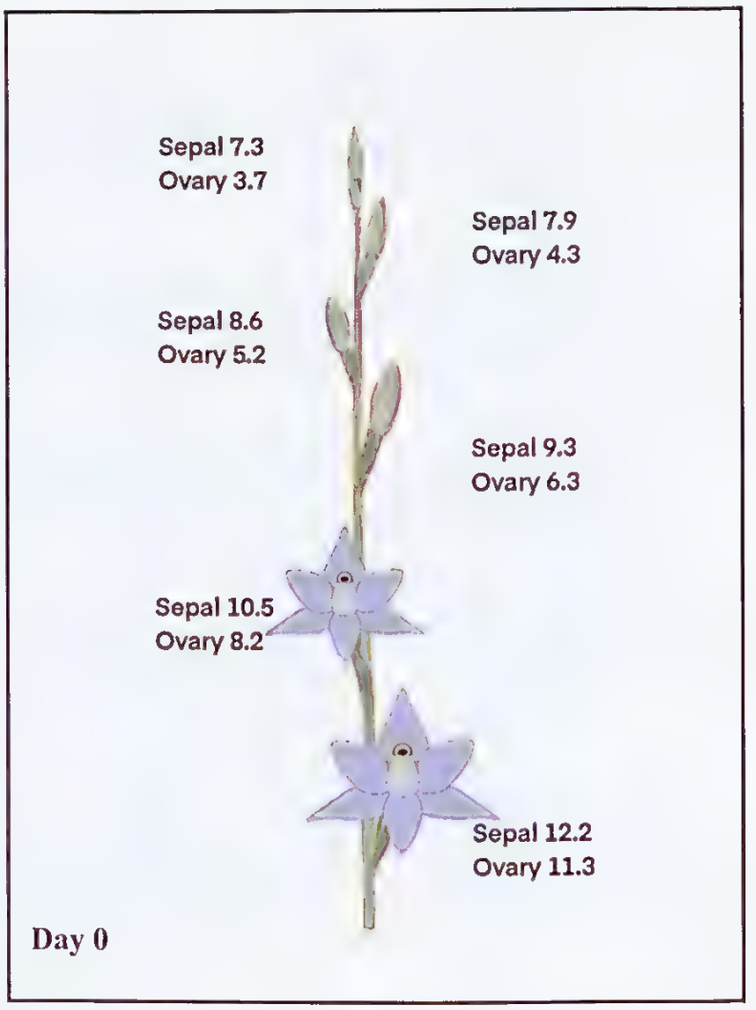
We searched for a function of best fit to model the normalised lengths of individual sepals and ovaries during their development over time, the relative lengths of sepals and ovaries at peak flowering along the raceme, and the number of days between flowers opening along the raceme. With these three models and an "average" measurement of ovary and sepal length for flower position one at peak flowering, it is straightforward to specify how a typical *T. arenaria* raceme develops over time, including the buds expanding, flowers opening and capsules developing.

Results

In 2017, 20 plants were measured with a minimum of two, a maximum of eight and a mean of 4.1 flowers per plant. In 2018 a further 14 plants were selected, four of which were late additions for plants that were damaged, with a minimum of three, a maximum of 11 and a mean of 5.6 flowers per plant. A total of 78 flowers had measurements recorded during each year, but this was reduced to 64 usable flowers in 2017 and 45 usable flowers in 2018. Table 1 shows the final number of recorded and usable observations and measurements.

It is easy to see that the lower flowers in the raceme were larger than the upper flowers (Fig. 2). Individual ovary and sepal lengths increased over time until peak flowering or soon after, and then plateaued and/or started to decline (Fig. 3). 2018p12 is the only plant with more than eight flowers, which may partly explain the divergent pattern for higher flowers in the longer racemes. The size of sepals and ovaries varied amongst the monitored plants, with some notably robust plants with large flowers, e.g. plants 2018p12 and 2018p13 (Fig. 2). This is also evident in Fig. 3, with a large range of values on equivalent days before or after peak flowering.

To reduce the individual differences between plants we performed two types of normalisation of the data: by individual flower and by individual racemes. The resulting models, and selected numerical values from these models, are provided in the Appendix. Our analysis shows that ovary



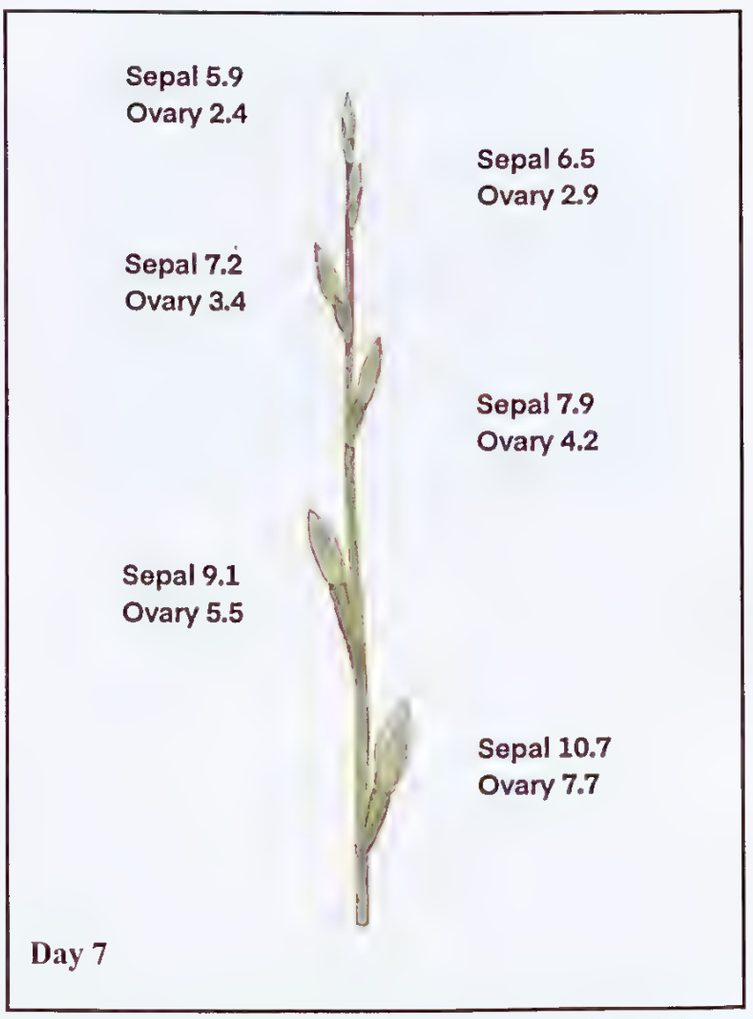
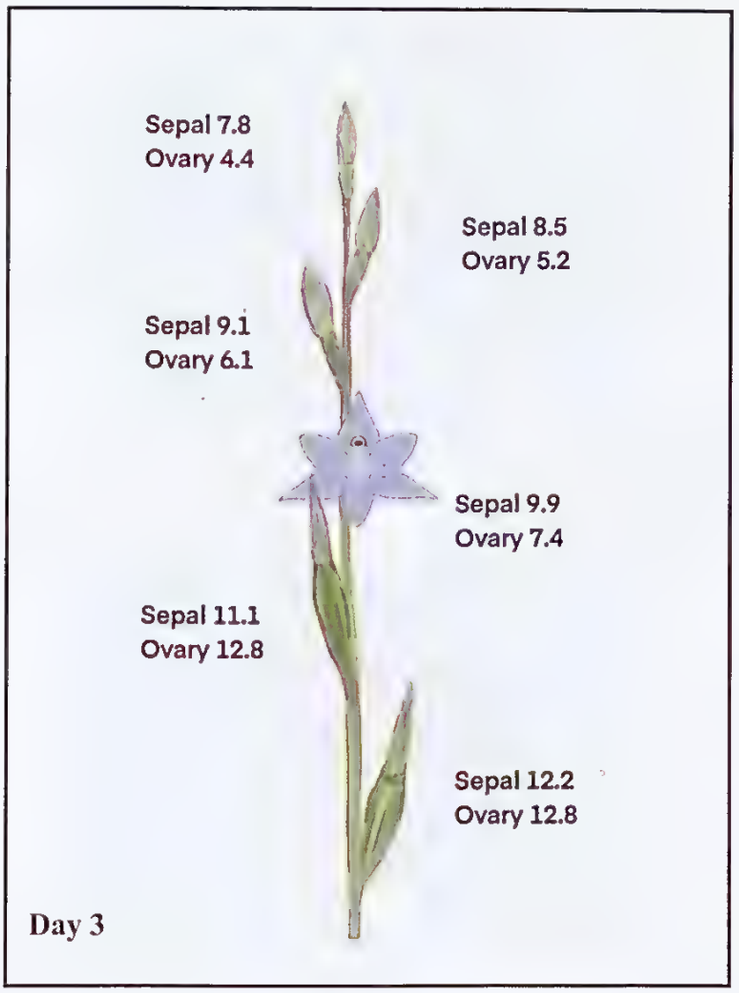
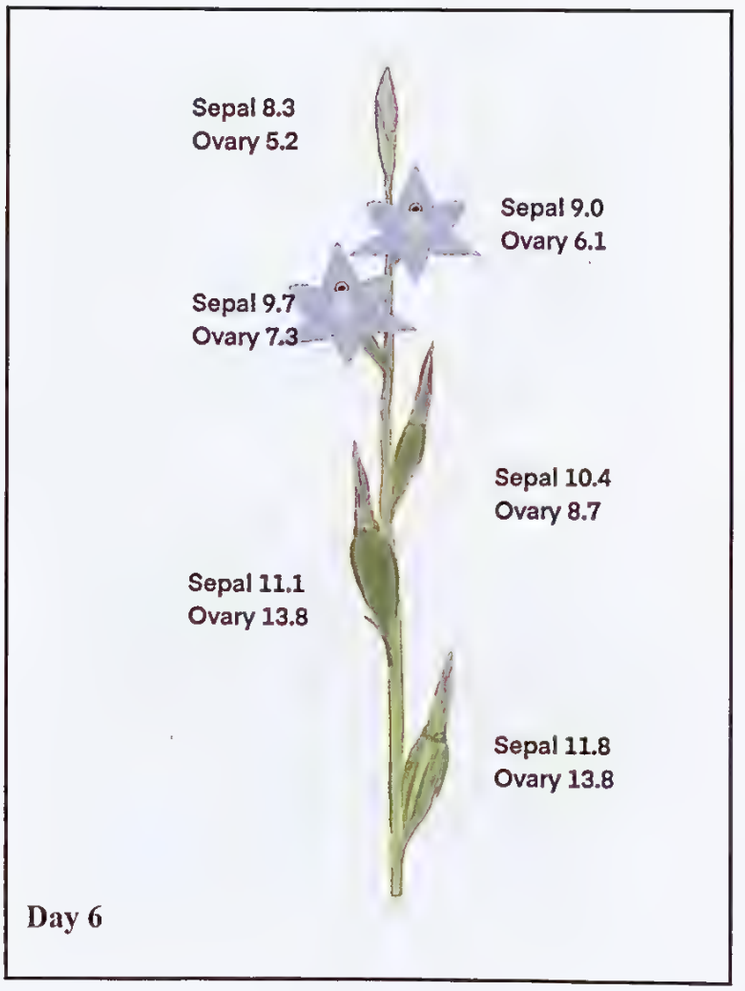
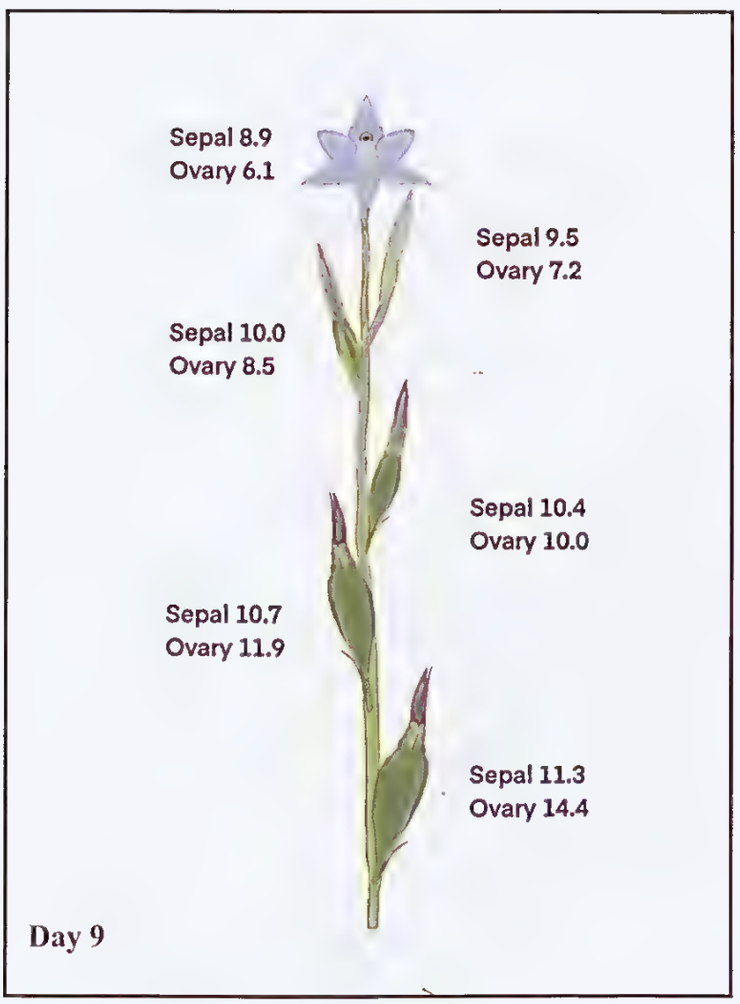
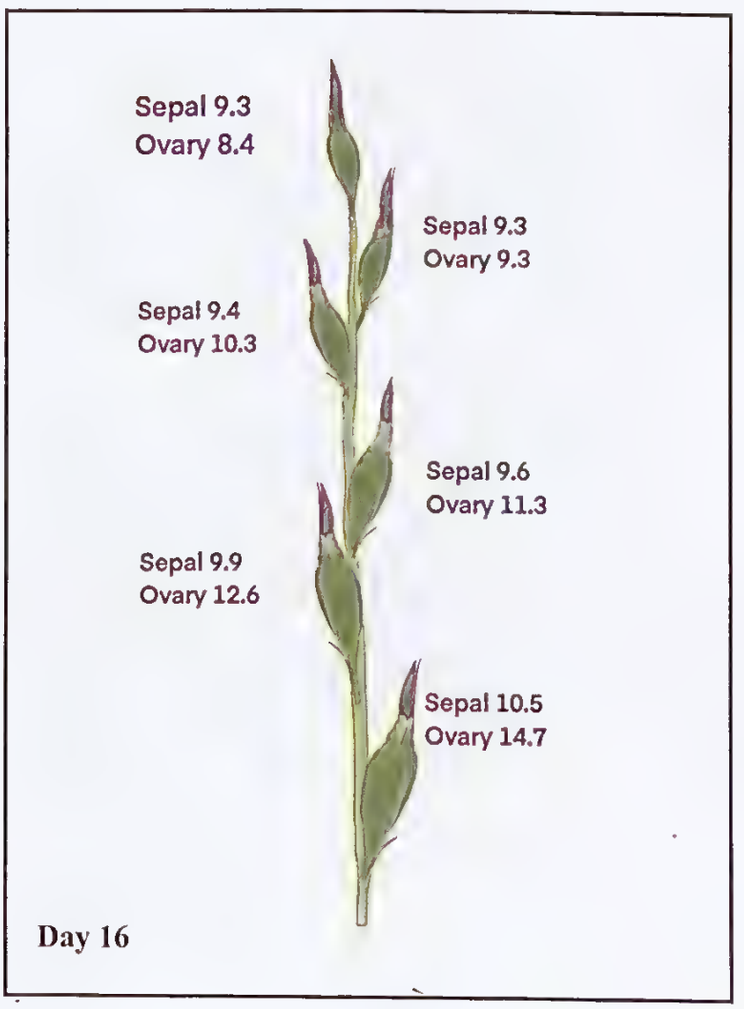


Figure 4. A model raceme of six flowers on selected days during its development. Measurements in mm.









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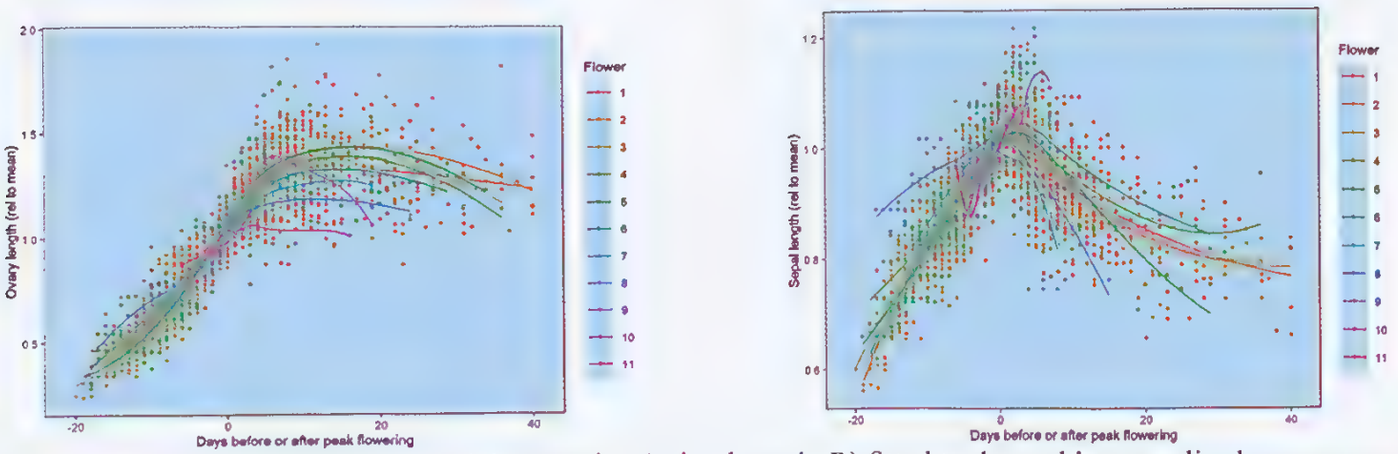
Ovary length (rel to mean)
Days before or after peak flowering
Flower
Sepal length (rel to mean)
Days before or after peak flowering
Flower

Figure 5. Non-parametric local polynomial regression (using loess in R) fitted to the usable normalised measurements of ovary (left) and sepal (right) lengths, aggregated by flower position.

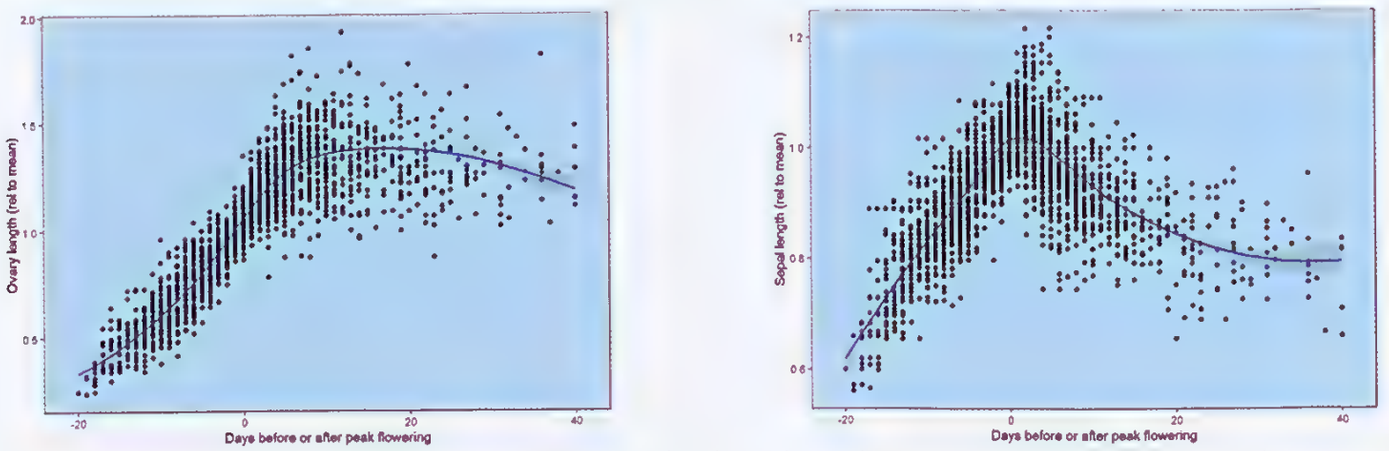
Ovary length (rel to mean)
Days before or after peak flowering
Sepal length (rel to mean)
Days before or after peak flowering

Figure 6. Non-parametric local polynomial regression (using loess in R) fitted to all the usable normalised measurements of ovary (left) and sepal (right) lengths.

length increased until about 10 days after peak flowering, then stabilised before reducing slowly as the capsule ripens. Sepal lengths increased almost linearly for three weeks before peak flowering and were stable for about 4 days after peak flowering before declining as the sepals shrivelled.

An analysis of the raceme-normalised sepal and ovary lengths at peak flowering indicates that ovary ($R^2 = 0.41$) and sepal ($R^2 = 0.51$) lengths decline logarithmically as flower position along the raceme increases, i.e. flowers further along the raceme are systematically smaller.

A linear model that best fits peak flowering along a raceme indicates that each flower opens 2.09 days after the flower immediately below it ($R^2 = 0.66$).

The mean of measurements for the lowest flower at its peak of flowering are sepal = 12.16 mm; ovary = 11.26 mm. Using the three models and these values, we created a stylised image of a hypothetical raceme for each day of its development. Figure 4. shows a selection of these images for a six-flowered raceme, with buds, flowers and ovaries/capsules shown scaled to the sizes specified by the models. The first image relates to a week before the lowest flower reaches its peak, the second shows peak flowering of the lowest flower, then 3-day intervals, and the last image is a week after peak flowering of the top flower. The stem of the raceme is shown as a fixed length, but in reality, this also expands as the flowers develop.

Discussion

Longitudinal monitoring of individual orchid plants adds an important new dimension to our understanding of native orchids and their ecology. While this study does not examine the broader questions of how best to manage orchid populations, it does provide an enhanced foundation for those studies. Modelling the annual development and life history of the plants being studied provides for a more sophisticated interpretation of data collected in multi-year longitudinal studies, like those that examine the association of burning with plant stature and reproductive success.

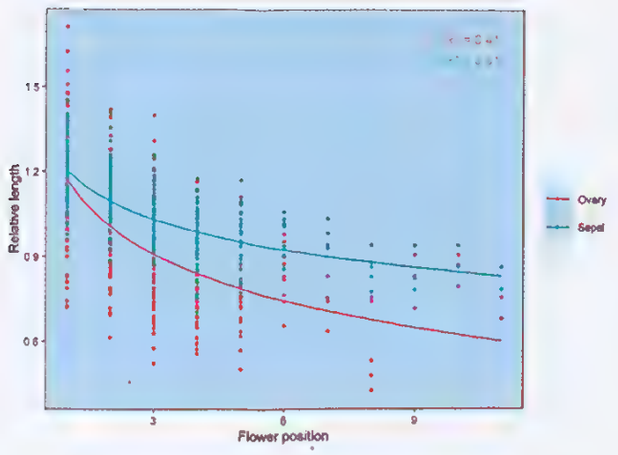

Figure 7. The raceme-normalised ovary and sepal lengths at peak flowering for the flower positions along a raceme, plus a logarithmic regression of best fit.

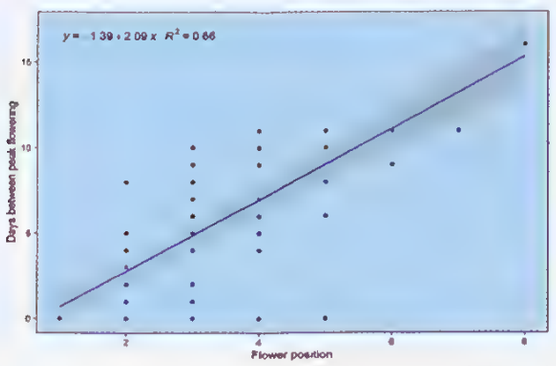

Figure 8. A linear model of the number of days between peak flowering of the lowest flower and each of the other flowers along a raceme.

Flower position	Relative length of ovary	Relative length of sepal
1	1.00	1.00
2	0.86	0.91
3	0.78	0.86
4	0.72	0.82
5	0.67	0.79
6	0.64	0.77
7	0.60	0.75
8	0.58	0.73
9	0.55	0.72
10	0.53	0.70
11	0.51	0.69

Table 3. Numerical values from the models of raceme-normalised (relative) lengths of ovaries and sepals at peak flowering for flower positions along the raceme. Values are scaled so that flower 1 has relative size 1.0.

Days before/after flowering	Ovary length (relative)	Sepal length (relative)
-20	0.32	0.60
-19	0.34	0.63
-18	0.36	0.65
-17	0.38	0.67
-16	0.40	0.70
-15	0.43	0.72
-14	0.45	0.74
-13	0.48	0.76
-12	0.51	0.78
-11	0.54	0.80
-10	0.57	0.82
-9	0.61	0.84
-8	0.64	0.86
-7	0.68	0.88
-6	0.72	0.90
-5	0.76	0.91
-4	0.80	0.93
-3	0.85	0.96
-2	0.90	0.97
-1	0.95	0.99
0	1.00	1.00
1	1.05	1.00
2	1.10	1.00
3	1.14	1.00
4	1.17	0.99
5	1.20	0.98
6	1.23	0.96
7	1.25	0.95
8	1.27	0.94
9	1.28	0.93
10	1.29	0.92
11	1.29	0.90
12	1.30	0.89
13	1.30	0.88
14	1.31	0.87
18	1.31	0.84
22	1.30	0.82
26	1.28	0.80
30	1.24	0.79
34	1.20	0.78
38	1.15	0.78

Table 2. Numerical values for selected days drawn from the models of normalised (relative) lengths of ovaries and sepals. Values are scaled as 1.0 on day 0, the peak of flowering. Negative values represent days before flowering.

Flower position	Opening day	Opening day (rounded)
1	0.00	0
2	2.09	2
3	4.18	4
4	6.26	6
5	8.35	8
6	10.44	10
7	12.53	13
8	14.61	15
9	16.70	17
10	18.79	19
11	20.88	21

Table 4. Numerical values from the model that specifies the number of days between peak flowering of the lowest flower and each of the other flowers along a raceme. Values are also shown rounded to whole days.

The present study selected *T. arenaria* as a convenient target species, mainly because of its accessibility and growth in sandy ground. However, the results are specific only to this species. For example, some related species likely have flowers that are more ephemeral and can open only for shorter periods. In principle, the same method can be used to derive models specific to many other priority species. Some Australian terrestrial orchids, for example, *Prasophyllum* sps., have racemes that open from the middle outwards, and this would require an adaptation to the modelling method.

In the present study, it would be desirable to reduce the amount of data that had to be classified as unusable because of grazing, the excessive variance between successive measurements and/or ambiguous identification of peak flowering. The latter is a particular problem for *Thelymitra* spp. It would be interesting to experiment with data collection that have recent measurements rather than sight-unseen and/or with measurement devices with ±0.1mm accuracy. It is also helpful to understand some details that are not immediately apparent *a priori*, like the fact that the junction between the capsule and shrivelled sepals can become increasingly obscure, and the capsules can be asymmetric.

This study models the dynamics of the sequential development of the flowers and fruits of *T. arenaria*. The method used could usefully be extended to other orchid species. The results can be used by taxonomists and ecologists to provide a greater understanding of the changes in orchid morphology over time.

Appendix

We provide details of the methods used to manage the differences between individual flowers and secondly between individual racemes. Once measured lengths have been suitably transformed, we can present models that describe the development of an "average" *T. arenaria* raceme and its flowers.

To model the development of an "average" flower, we worked with normalised or relative lengths of the sepal and ovary. These normalised lengths were calculated separately for each sepal and ovary: each measured length was divided by the respective calculated value at peak flowering. This transformation enables an exploration of models that best fit the longitudinal sequences of normalised ovary and sepal lengths for each flower position along a raceme.

Figure 5 depicts normalised sepal and ovary lengths. With this transformation, the development of all flower positions in the raceme appears to be similar, which provides a motivation to merge all normalised data into unified models (Fig. 6).

Ovary length increases until about 10 days after peak flowering, then stabilises before reducing slowly as the capsule matures (Fig. 6). Sepal lengths increase almost linearly for three weeks before peak flowering. They appear to increase slightly immediately after peak flowering, but this may be partly explained by the sepals elongating as they start to wither and lose their boat-shaped structure. Within a few days of opening, the sepals start to wither and shrivel, a process that takes about three weeks. Figure 6 also shows non-parametric local polynomial regressions (using *loess* in R) of best fit to the two sets of normalised data points. This results in a function that does not

necessarily have a simple formula associated with it, but it can be modelled numerically.

To model the development of an "average" raceme, we quantified the overall robustness of individual racemes. We calculated this twice, as the mean of all usable ovary lengths and sepal lengths along a raceme. Next, raceme-normalised sepal and ovary lengths were calculated by dividing measured lengths by the respective mean length within their raceme. Finally, raceme-normalised ovary and sepal lengths at peak flowering were calculated for each flower position.

Figure 7 depicts these raceme-normalised ovary and sepal lengths at peak flowering, together with logarithmic regressions separately for ovary and sepal lengths; both of which provide a reasonable fit. The equations for these regressions are:

$Ovary_{RNL} = 1.1695 - 0.2377 \times \log(FP)$, $R^2 = 0.41$

$Sepal_{RNL} = 1.2042 - 0.1558 \times \log(FP)$, $R^2 = 0.51$

Where $Ovary_{RNL}$ = Raceme-normalised length of the ovary at peak flowering

$Sepal_{RNL}$ = Raceme-normalised length of sepal at peak flowering

FP = Flower position

Having identified peak flowering for each flower position along a raceme, we calculated the number of days between the peak flowering of the lowest flower and every other flower. Flowers open in sequence from the lowest to the top flower in a raceme, although there can be multiple flowers open on the same day in suitable conditions. Plants for which information was unavailable about peak flowering of the lowest flower were deemed to be unusable. Unfortunately, the unusable plants include 2018p12, which provided the only data points for flowers 9, 10 and 11.

Figure 8 shows the usable data and a line of best fit, which we used to predict the timing of flowers opening along the raceme. We choose not to insist that the line of best fit passes through *Days between peak flowering* = 0 and *Flower position* = 1. Instead, we use the data to focus on predicting the slope and therefore the latency between successive flowers. When we insist on this fixed intercept, the latency between successive flowers is 2.32 days.

Table 2 shows normalised (relative) lengths of ovaries and sepals for selected days during their development. Table 3 shows relative ovary and sepal lengths at peak flowering for each flower position along the raceme. Table 4 shows the number of days between peak flowering of the lowest flower and each of the other flowers along a raceme.

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Phil Collier has interests in the taxonomy of native flora, managing conservation land for the benefit of threatened flora and leaving a legacy of increased knowledge about land management methods and their benefits. Robin Garnett enjoys learning about the amazing interactions in the living world and sharing new knowledge.

Caleana disjuncta (D.L. Jones) M.A. Clem. Populations in Cox Scrub Conservation Park, South Australia

Text and photos by Leo Davis | leodavis@adam.com.au

Abstract

A census of plants of *Caleana disjuncta* at Cox Scrub Conservation Park, South Australia, located more colonies than previously known. Repeated counts show that numbers observed at early leaf stage can be ten times or more higher than that at flowering time when most leaves of non-flowering plants have disappeared. A census of flowering plants is also highly likely to miss significant numbers of beheaded flowers. Fire is not a prerequisite for the species to flower at this site.

Introduction

Caleana disjuncta (D.L.Jones) M.A.Clem. was first described as *Paracaleana disjuncta* D.L. Jones in 2003 from specimens discovered on 29 October 1995 in Cox Scrub Conservation Park by Denzel Murfet and Rosemary Taplin and also proposed as *Sullivania disjuncta* (Jones 2021). The specific epithet refers to the widely separated isolated occurrences, in varying habitats, in Victoria, Adelaide Hills, Kangaroo Island and Western Australia. The species is not considered threatened in Western Australia but is restricted to tiny occurrences in mainland South Australia and is listed as endangered (Threatened Species Profile 2008).

Cox Scrub Conservation Park covers 563 hectares ha and is located 55 km south of Adelaide. It has been a proclaimed park since 1970. Perhaps because it is situated on very poor soils (undulating sands over ironstone), the park has been minimally disturbed. Apart from beekeeping, there has been no previous use. While rabbits are plentiful, there are very few introduced plant species, an exception being a stand of exotic *Eucalyptus cladocalyx* (sugar gum) growing on better soils near a creek line.

There are variations in habitat in the park, including a winter swamp, but it mostly consists of open scrub to low open forest of *E. baxteri,* dwarfed by poor soils, *E. cosmophylla* and *E. fasciculosa* over a heath understorey that is dominated by *Banksia ornata.* This is a very rare vegetation type in the Adelaide Hills. There are large areas of almost pure sand heath with mainly *B. ornata* and a scattering of eucalypts. The *C. disjuncta* are found in more open parts of this, in deep sands, with the emphasis on 'found' because it may well also occur, unseen, in areas of denser vegetation. This habitat is not quite that described in Threatened Species Profile (2008) as 'on leached peaty grey sands, near soaks, growing with low sedges and *Eucalyptus baxteri'.*

Most observers see plants in the field only at flowering time. Long before that, leaves are initially primarily olive green and have 3–7 roughly parallel plum-coloured veins, the central one dominant. The leaves change markedly across their life cycle. Initially, they lie close to horizontal and off the ground (Fig. 1). At flowering time leaves turn deep plum and are carried upward by the flower stem. They become more erect, have a pointed tip, are thinner and are generally withered (Fig. 2). At Cox Scrub my small range of measurements showed the tallest plants to be 170 mm tall with flowers to 24 x 10 mm on a 10 mm ovary. Jones (2021) describes the flowering stem as 50–130 mm with flowers 14–18 x 7–8 mm. The flowers have a prominent creamy green column wing. The labellum sits atop a flat strap and is reddish or purple near the strap but the front third or more is densely studded with shiny black calluses (Fig. 3).

What began as simply a census exercise revealed the difference between numbers recorded at flowering time and early leaf stage. A formal study was begun to quantify and expand this observation.

Methods

On 3 November 2017, I joined a field trip comprising Clive Chesson (leader), Claire Chesson, and Helen McKerral, to carry out a census of flowering plants of *Caleana major* and *C. minor* in the park. We accidentally discovered 15 plants of *C. disjuncta* in bud or flower, near to four times what we understood to be the known population in the Adelaide Hills.

I returned to the site on 20 August 2018 with Tim Jury (Nature Conservation Society of South Australia) to put a cage over the plants that had been identified. This time we found 42 non-flowering plants with remarkably distinctive leaves, and two cages were installed. On 19 October 2018, with the Chessons, Helen McKerral and Ed Lowrey, we were surprised to find only two flowers and 11 buds.

On that day we also visited the location of a historically recorded population we had been told of, where four leaves and two buds were found. An intensive search within 50 m of the spot located a leaf, 38 buds and a flower. On 25 October 2018, three cages were installed over most of the new finds.

On 1 August 2019, we found a patch a little more than a square metre in area, near the 2017 site, with 175 leaves. Three cages were placed over most of these on 22 August 2019. On 28 October 2019 hand pollination was carried out with a permit, transferring pollen between sites more than one km apart. On 4 November 2019, we counted five hand-pollinated (bagged) flowers and five finished flowers. Seed pods were later collected and deposited with the Seed Bank at the Adelaide Botanic Gardens.

In early August 2021 around 250 leaves of *C. disjuncta* were located at the two widely separated locations, including some new areas. Four uncaged quadrats of 50 x 50 cm were marked out, and leaf numbers were recorded in them, as well as in nine metal cages and some unprotected sites. Records of numbers of leaves, buds, beheaded plants and flowers were made at all these locations on repeated occasions (Table 1).

Results

We have found two populations of *C. disjuncta* a kilometre or so apart and there are likely more occurrences in the park. It was notable how distinctive the leaves of this species are in their early stage so that they are easily recognisable and distinguishable from those of pre-flowering *C. major* and *C. minor*, which grow sometimes intermingled in the same locations (Fig. 1). Caged plants are illustrated in Fig. 4. Five flowering plants and more than 50 leaves were located outside locations recorded in Table 1. Significant numbers of flowers had been beheaded, even inside protective wire cages.

Table 2 compares total plants determined by different counting methods at different times. There was no evidence of natural seed production over five years and no pollinators were observed. Along with many smaller occurrences, we found patches of 42 leaves in 2018. In 2019 leaf numbers were 26, 58 and 175. In 2021 there were five patches of 20–40 plants, and one of 75 plants. In each case, the leaves were closely spaced. These were most likely 'spreading clonal colonies' (Jones 2021).

Discussion

Many orchid species have more non-flowering than flowering individuals. Some extreme cases include *Prasophyllum elatum* R.Br. (tall leek-orchid), which is found in all states except Northern Territory. It only produces leaves until widespread flowering follows a fire event. Many species that produce some flowers almost every year produce many more non-flowering than flowering plants. Some members of *Pterostylis* R.Br. (greenhoods) such as *P. dolichochila* D.L. Jones & M.A. Clem. can produce up to a hundred

Figure 1. Young leaves of *Caleana disjuncta* (flat), mixed with *Pterostylis minor* leaves (strappy).

Figure 2. Older leaves of *Caleana disjuncta* on a flowerng stem.

Figure 3. Flower of *Caleana disjuncta.*

Figure 4. Caging an area containing *Caleana disjuncta.*

	12 Aug. 2021	26 Aug. 2021	08 Oct. 2021	17 Oct. 2021	01 Nov. 2021
Area 1					
Original site	8 leaves	NR*	NR	3 leaves	1 leaf
Large Cage East (green wire)	21 leaves	NR	NR	15 buds, 10 leaves	2 flowers, 2 finished, 9 beheaded, 2 buds, 2 leaves
Small Cage West	14 leaves	NR	NR	1 bud	1 flower
Large Cage West	8 leaves	NR	NR	1 leaf	0
Total in Area 1	51 leaves	Data incomplete	Data incomplete	16 buds, 14 leaves	14 flowers, 3 leaves
Area 2					
New find 2017 Cage A.	6 leaves	6 leaves	1 bud, 5 leaves	1 beheaded, 6 leaves	1 beheaded
New find 2017 Cage B.	0	NR	NR	NR	3 flowers. 1 beheaded
New find 2018 Cage A.	15 leaves	19 leaves	1 bud	0	0
New find 2018 Cage B.	0	0	0	0	0
New find 2018 Cage C.	0	19 leaves.	11 buds, 1 beheaded, 1 leaf	5 buds	4 flowers, 1 damaged
New cage 2020.	33 leaves	27 leaves	8 buds, 1 beheaded, 9 leaves	8 buds, 4 leaves	1 beheaded, 1 flower with bent stem
New area track-side 2020.	12 leaves	8 leaves	1 flower, 4 buds, 2 leaves	2 flowers, 1 bud	0
New area 2021. Quadrat B81.	39 leaves	15 leaves.	1 bud, 1 beheaded, 11 leaves	2 beheaded, 2 leaves	1 beheaded
New area 2021. Quadrat B82.	21 leaves	26 leaves	2 buds, 8 leaves	2 buds, 6 leaves	2 beheaded, 6 leaves
New area 2021. Quadrat B83.	12 leaves	8 leaves	3 buds, 2 beheaded, 2 leaves	2 flowers, 1 bud	1 flower, 2 beheaded
Total in Area 2	138 leaves	Data incomplete	Data incomplete	Data incomplete	18 flowers, 6 leaves

*NR = not recorded.

Table 1. Observed leaves, buds and flowers of *Caleana disjuncta* in 2021.

2021	Plant number; flowers only	Plant number; flowers + beheaded flowers.	Plant number; leaves, before flowering time.
Area 1	5	14	51
Area 2	10	18	138
Total	**15**	**32**	**189**

Table 2. Summary of census numbers of *Caleana disjuncta*, based upon different count criteria

times more unflowered rosettes than the distinctly different flowering plants.

Caladenia species (spider-orchids) have varying proportions of flowering and non-flowering plants. A twenty-year census of *Caladenia behrii* Schldl. showed that observed flowering plants represented just over half the emergent plants, with true population numbers, including tubers that can lie dormant for one or more years, being three or more times higher (Davis 2019, 2020). The similarity of the leaves of spider-orchids to one another makes it all but impossible for any but very skilled observers to identify species at leaf stage. By contrast, it is possible to distinguish clearly between leaves of *Caleana major*, *C. minor* and *C. disjuncta*, the three species occurring in South Australia, well before buds and flowers appear.

There are significant inaccuracies if a census of *C. disjuncta* is taken at flowering time. Many leaves that appeared in winter are no longer detectable at flowering time. In retrospect, it is likely that the number of plants, likely all leaves, found around the historic site on 19 October 2018 (a leaf, 38 buds and a flower) would have been significantly higher had we looked a few weeks earlier. Beheaded plants are likely to be overlooked in a general search, especially if they are isolated individuals. They can be found with some difficulty in designated quadrats or cages after close scrutiny. Based on our observations, a more accurate estimate of population numbers is obtained by counting easily identifiable leaves two or more months before flowering.

We have searched only two relatively small parts of the park. In one case we were guided to a known but tiny population. Our careful searching very much increased the number of plants detected. Before going to this site, we had stumbled upon an occurrence over a kilometre away, while doing a census of *C. major* and *C. minor*, which are far from common. It seems unlikely that we have found the only two patches with nothing between or beyond them. Quite untested is the hypothesis that there could be hundreds more undiscovered plants. This species might even be even more common in the park than the more easily spotted *C. major*.

Common wisdom among local observers has been that fire is required to initiate the flowering of *C. disjuncta*. The Department of Environment and Heritage states 'searching at both the KI and SL sites has not revealed any sign of plants in years between fires; seems that flowers only appear after a fire or some other disturbance.' (Threatened Species Profile 2008). Our observations over several years show that this is not the case at the Cox Scrub sites.

The whole park was burned in 1983 in the Ash Wednesday fire (Fire Management Plan, 2009-19, p.19). In May 2013 a controlled burn broke free and burnt some of the park. Clive Chesson, who has regularly conducted botanical surveys in the park, stated that it certainly did not reach Area 2 and probably not Area 1 (pers. comm.). No fire has occurred in Area 1 since at least 2013 or in Area 2 since 1983. Plants in flower are difficult to see, especially when there are few present. Those detected tend to be in open areas, and yet closer searches have found them, nearly invisible,

in nearby vegetation. After a fire, plants may be more visible. While fire may encourage extra flowering this cannot be confirmed by our data. Varying numbers of plants in flower were observed across five successive years, with no natural or controlled fires during that time or in the years immediately before.

Caging did not stop flowers from being beheaded. An untested hypothesis is that invertebrates, such as the tiny grasshoppers observed by Ed Lowrey on some flowers might be responsible for some of the damage.

Over three seasons, the only seed pods we observed were from flowers we had hand pollinated. We concluded that it was likely that little natural pollination was occurring. Jones considers that the plants increase vegetatively from tubers (Jones 2021). A program of hand-pollination might be considered, avoiding pollination between plants in a clonal plot.

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Leo Davis retired 16 years ago after 45 years of teaching. He has much more work to do on orchid conservation studies.

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ANOS Far North Coast Group Spring Show 2022

Text by Roslyn Capell. Photos by Roslyn Capell, except as indicated. | capell666@ozemail.com.au

Far North Coast Group held its 2022 show at the Richmond Tweed Regional Library at Goonellabah, near Lismore. This was our first show since 2019 due to COVID-19 restrictions. Just when the limitations and restrictions imposed by the pandemic were easing, the rains came.

In February and March 2022, north-east New South Wales and south-east Queensland endured several weeks of torrential rain which caused catastrophic flooding with damage and loss of life in both states. The last week of February was the wettest in north-east New South Wales since 1900. The Wilsons River rose to 14.40m at Lismore, more than 2m higher than previous record floods in 1954 and 1974, inundating the central business district and surrounding areas. After a brief respite when residents commenced clean-up and recovery work, the rain returned and further major flooding occurred, causing further devastation. Low-lying areas were evacuated for a second time within weeks.

The river level eventually dropped but the city and the region are still dealing with wide-ranging impacts. The deluge caused massive damage to property and infrastructure, loss of livestock, and destruction of crops. Five lives were lost in the Lismore area. Many businesses remain boarded up and may never re-open. Eleven thousand homes were damaged across the Northern Rivers, with four thousand deemed uninhabitable and many people are still living in emergency accommodation. One of the buildings flooded was the Lismore Library, where ANOS Far North Coast Group held its meetings, and the library remains closed.

Some orchid collections were lost to the floods, and surviving collections faced less-than-ideal conditions. Continuing high humidity, overcast days and very cold spells in winter caused setbacks to growth and delayed flowering. Despite these challenges, growers and plants rallied, and there was a fine display at the show in the last week of August with an interesting mix that included Australian *Dendrobium* species, Australian and Australasian *Dendrobium* hybrids and early flowering plants of *Cymbidium canaliculatum*.

Show Results

Grand Champion Orchid and Champion Native Species was Tony Trigger's *Dendrobium speciosum* var. *speciosum* 'Bevan' x *D. speciosum* var. *grandiflorum* 'Michelle'.

Reserve Champion was *D. speciosum* var. *grandiflorum* 'Rock Pile', also owned by Tony Trigger.

Champion Native Hybrid was Kevin Foster's *Dendrobium* Gracillimum (*D. gracilicaule* 'Sid's Bright Yellow' x *D. speciosum* var. *grandiflorum* 'Mt Larcom Gold').

Champion Seedling was awarded to Kevin's *Dendrobium* Bellinger Charm x *D. speciosum* var. *grandiflorum* 'Michelle', a cross he made himself, so especially pleasing. The hybrid contains a busy genetic makeup of 56.3% *D. speciosum*, 27.4% *D. kingianum*, 11.7% *D. tetragonum* and 1.6% each *D. bigibbum*, *D. falcorostrum* and *D. fleckeri*.

Champion Australasian Orchid was the author's *Dendrobium* Elated (*D. macrophyllum* x *D.* Fiftieth State) with a background of 62.5% *D. macrophyllum*, 25% *D. bigibbum* and 12.5% *D. atroviolaceum*. The colour is mainly ice-green but there are faint purple lines in the throat.

Dendrobium speciosum var. *speciosum* 'Bevan' x *D. speciosum* var. *grandiflorum* 'Michelle'

Dendrobium speciosum var. *grandiflorum* 'Rock Pile'

Dendrobium Gracillimum

Dendrobium Gracillimum – closeup of flowers

Dendrobium Bellinger Charm x
Dendrobium speciosum var. *grandiflorum* 'Michelle'

Dendrobium Elated

Champion Junior Grower, Luklin Smith, with his trophy. Photo Muzza Deano Smith.

Dendrobium lichenastrum 'Neville's Delight'

Champion Junior was Luklin Smith's *Dendrobium* Duffy (*D. pugioniforme* 'Dorrigo' x *D. striolatum* 'Green Ghost').

Best Specimen and Best Culture went to Mike Fish's outstanding exhibit of *Dendrobium lichenastrum* 'Neville's Delight'. This plant has been growing on its mount of *Melaleuca styphelioides* (prickly paperbark) for about 20 years, most of that time in Mike's care. It has grown all around the branch, entirely covering it, and the exhibit was in excellent condition with 60 flowers and an estimated 340 buds in various stages of development. A plant to be proud of!

The group is fortunate to have two enthusiastic junior members, 9 yo Luklin and his sister, Thaleh, who also had success in the show. Luklin and Thaleh are the children of the group's treasurer, Muzza Deano Smith.

Ira Butler Trophy Committee Trophy Nominations

Text by David James | davidljames@bigpond.com

Following discussions and planning which began in 1974, the Ira Butler Trophy Committee, a subcommittee of ANOS Inc., was established in 1981, and is a currently a joint venture by ANOS Inc. and the Orchid Society of New South Wales (OSNSW). For judging purposes, there are three judges appointed from each society, and a chairman who holds a casting vote should it be required.

The first plant to be awarded was *D.* Gloucester Sands, owned by L. Jarvis. The number of categories gradually increased to four between 1981 and 2004 and eligibility requirements have been broadened. The awards have been named after three prominent Australian orchid enthusiasts, Ira Butler, Bill Murdoch and G. Hermon Slade.

Growers of Australian and Australasian orchid species and hybrids can nominate for one of four prestigious annual Ira Butler Trophy Committee (IBTC) trophies. They are:

Ira Butler Champion Australian Native Orchid Hybrid of the Year (est. 1981). There is a gold Ira Butler Trophy and 5 silver certificates for the runners up. Owners of all other plants nominated for the Ira Butler Trophy receive a certificate indicating they were nominated.

Bill Murdoch Champion Australian Native Orchid Species of the Year (est. 1993) There is one Bill Murdoch Trophy and 5 silver certificates. The committee, at its discretion, may award up to two certificates of special recognition. Owners of all other plants nominated for the Bill Murdoch Trophy receive a certificate indicating they had been nominated.

G. Hermon Slade Champion Australasian Native Orchid Hybrid of the Year (est. 2004) There is a trophy for the winner, and owners of all other plants nominated receive a certificate indicating they were nominated.

G. Hermon Slade Champion Australasian Native Species of the Year (est. 2004). There is a trophy for the winner, and owners of all other plants receive a certificate indicating they had been nominated.

Eligibility for Nomination

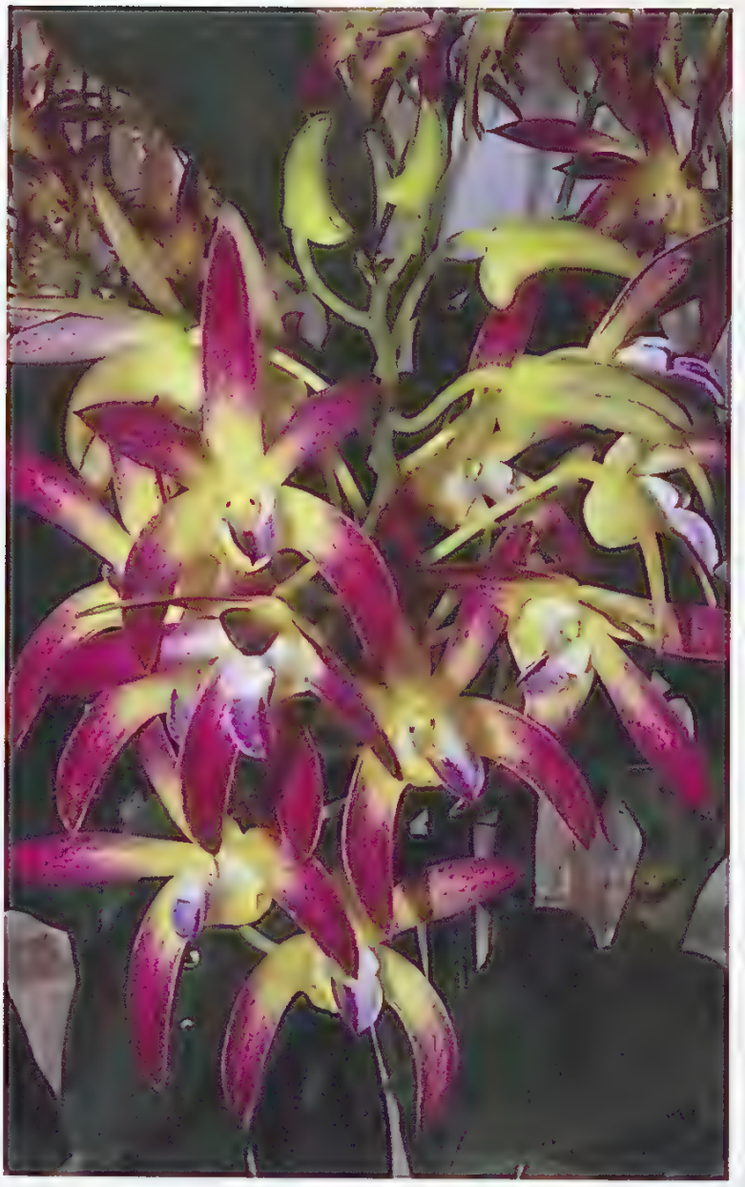
There are a number of ways for a plant to be eligible for nomination:

Receive a quality award (HCC, AM or FCC) or award of distinction (AD) from any recognized judging authority. This includes ANOS Inc, the Orchid Society of NSW (OSNSW), the Australian Orchid Council (AOC), the Queensland Orchid Society (QOS), the Orchid Societies Council of Victoria (OSCOV), the North Moreton Queensland Orchid Council (NMQOC), the New Zealand Orchid Society (NZOS) or the Orchid Council of New Zealand (OCNZ)

Win as show champion in the following categories:

- Grand champion
- Reserve champion
- Champion Australian or Australasian native orchid species or hybrid
- Champion species or hybrid

Ira Butler Trophy 2019 for Champion Australian Native Orchid Hybrid of the Year 2019. *Dendrobium* Australian Butter Bright 'Razz' HCC/ANOS 2019 grown by Carole Barnett

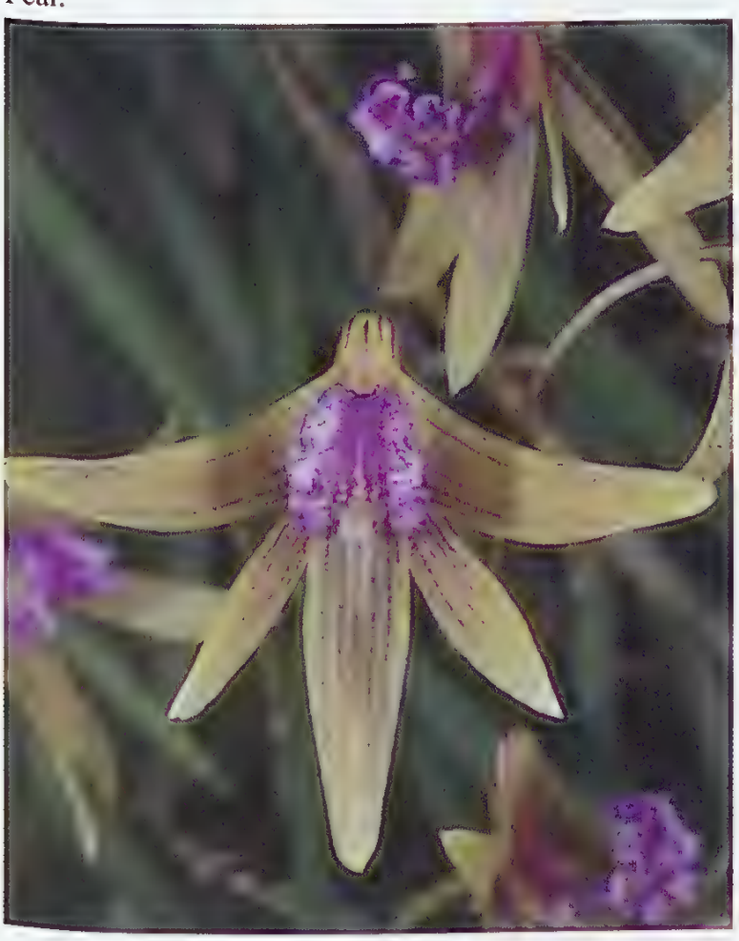


Ira Butler Trophy for Champion Australian Native Orchid Hybrid of the Year 2018. *Dendrobium* Jayden 'Sheen' AM/ANOS 2018 grown by Henk van den Berg.

G. Hermon Slade Trophy for Champion Australasian Native Orchid Hybrid of the Year 2018. *Dendrobium* Nancy Fairfax 'Leeann' AM/ANOS 2019 grown by Arnold Lockrey.

G. Hermon Slade Trophy for Champion Australasian Native Orchid Hybrid of the Year 2019. *Dendrobium* Martin 'Gold' HCC/AOC 2012-HCC/ANOS 2019 grown by Down Under Native Orchids.

G. Hermon Slade Trophy for Champion Australasian Native Orchid Species of the Year 2013. *Dendrobium tangerinum* 'Blackalls' AM/ANOS 2013 grown by Fred Fear.



G. Hermon Slade Trophy for the Champion Australasian Native Hybrid of the Year 2017. *Dendrobium* Tweetas 'Violet Lip' HCC/ANOS 2016-ACC/ANOS 2017 grown by Down Under Native Orchids.

- Champion species section such as *Cymbidium, Dendrobium, Dendrobium bigibbum, Dendrobium kingianum, Dendrobium speciosum.*
- Champion genus hybrid such as *Cymbidium, Dendrobium, Sarcochilus.*
- Or be judged the winner of a section or class if there is no champion.

Once a plant has been awarded an IBTC trophy it will be ineligible for further nomination unless it receives a higher award or is subsequently given an award.

If there is any question on the eligibility of exhibits for nomination the secretary of the IBTC can be contacted by email or mail at PO Box 5396, Chullora, NSW, 2190. Nomination forms are available from the IBTC website.

How To Enter

The competition runs from 1st January to 31st December each year. Entries must be submitted by the second Monday in January of the following year. There is currently a $15 fee for each nomination. Scanned copies of the completed nomination forms and original digital photographs (not reduced or digitally altered) can be emailed to the secretary of the IBTC.

Due to the COVID-19 pandemic the nominations received for 2020 and 2021 have been limited. Most of those awards would have been judged under special conditions (i.e., judged remotely and not face to exhibit) to comply with pandemic restrictions and awards were suspended for these years. These nominated plants will be judged with the 2023 entries.

Full information on how to enter, and the history of the awards, can be found at: irabutlertrophy.org.au.

ANOS Central Coast Group 40th Annual Spring Show 2022

Text Carole Barnett, photos Jody Cutajar | carolesbarnett@gmail.com

The ANOS Central Coast Group (ANOS CCG) shows are held at Narara Valley Nursery on the Central Coast of New South Wales thanks to the generosity of the owner Noel Harding. Holding the shows at a general plant nursery allows for a wide number of plant enthusiasts to visit the show and attracts new native hobbyists. With a solid membership and numerous talented growers across a diverse range of genera, our shows are continually providing opportunities to view, discuss and purchase quality orchids.

The wet, overcast, and cold weather on the east coast of Australia, synonymous so far with 2022, did not prevent the show being a great success. The number of *Dendrobium* species and hybrids, *Dendrobium* Sect. *Rhizobium* along with some very interesting Australasian species and hybrids made for a highly colourful display. The quality of seedlings benched this year also heralds great things for the future.

With the lack of sunlight and warmth, flowering appearing to be held back, it was thought that entry numbers could be down. With 140 entries, down only marginally from the previous 2019 Spring Show of 152 entries benched, this wasn't entirely the case. The slight drop in numbers was not apparent to the onlookers as the benching and sales tables were full. This was, in part, due to a number of very large and very floriferous *D. speciosum* taking centre stage on the top row of benching. A magnificent sight indeed and the first in years at the ANOS CCG Spring Show as the show had been pushed back a couple of weeks in an attempt to catch some of this flowering. We may now have to rethink our benches as these massive specimens were not easy to get in place!

The sales table was a show in its own right, with many tables of flowering, quality orchids available to members and public alike. The staff were kept very busy. This was probably the most flowering orchids I have seen on the sales benches. The lack of shows over the Covid years seems to have had a direct impact on the number of plants for sale as we all try to find a little bit of space in the shade houses after having three years of additional growth to contend with, leading to a record number of sales for the Group.

The sausage sizzle out the front of the nursery was very successful over the weekend with a constant flow of patrons looking for a tasty treat. The raffle consisted of a wheelbarrow, donated by Bunnings, that overflowed with orchids, fertilisers, and other goodies donated by members, and it was extremely well supported this year. It was wonderful to see so many ANOS CCG members turn up to support their show and also to see a number of ANOS Newcastle members who came down for a visit and a catch up.

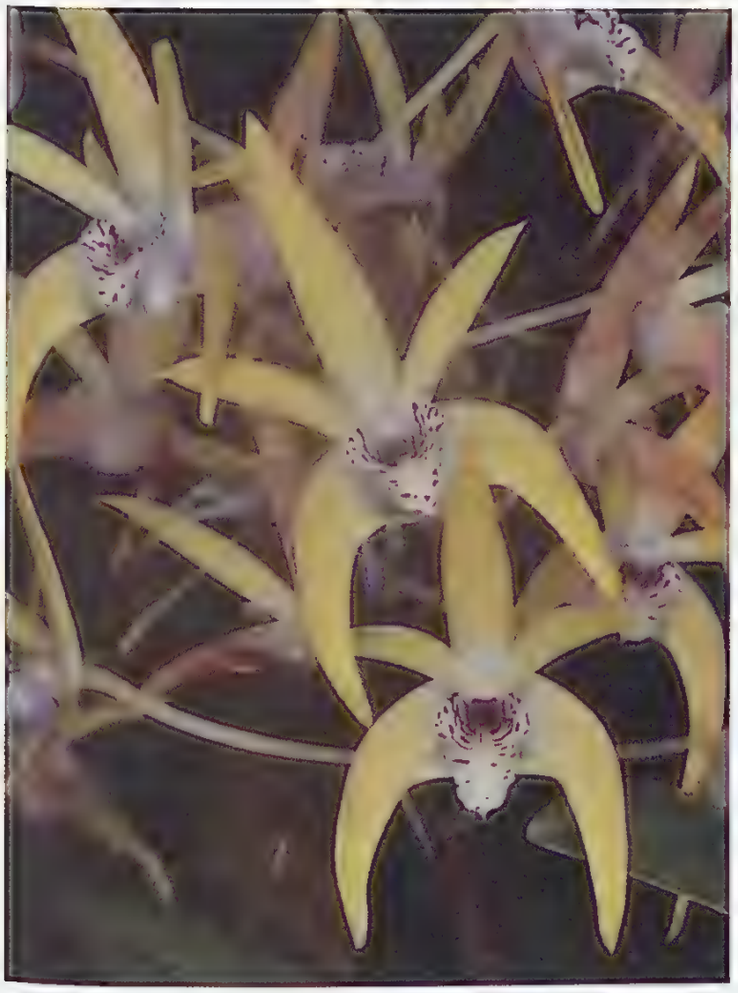
Judging was held on a very chilly Thursday night in an unheated shed with two panels determining the winners. It was decided that the Grand and Reserve Champions would not, on the flowering on the night, be awarded higher than their current AM/ANOS awards and therefore no quality awards were given. A very unusually coloured, well grown and beautifully flowered *D.* Gundy Moon 'Blushing' grown by Jody Cutajar was awarded a provisional AD/ANOS 2022 (for colour) on the night.

Show Champions

Grand Champion and Champion Speciosum was *Dendrobium speciosum* var. *curvicaule* 'Daylight Moon' AM/ANOS 2014 grown by George Oehm and Daisy.

Reserve Champion and Best Australian Hybrid was *Dendrobium* Grey Ghost 'Tumbi' AM/ANOS 2006 grown by Neville Lee.

Champion Australian Species was *Dendrobium aemulum* 'Sidney' grown by Nicholas Watt.



Dendrobium Wild Thing

Dendrobium speciosum 'Lyrebird' x '97 Albino'

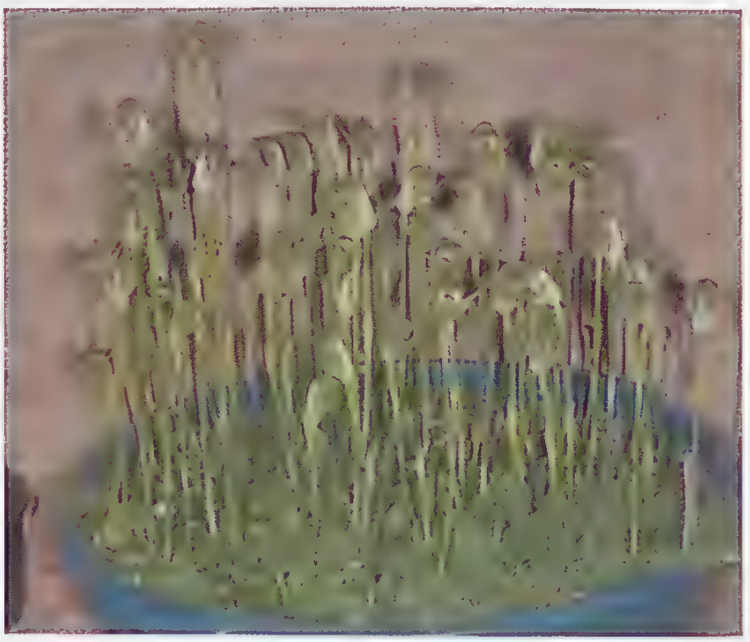
Dendrobium speciosum var. *curvicaule* 'Daylight Moon' AM/ANOS 2014

Dendrobium Dunokayla 'Champ 07'

Dendrobium Grey Ghost 'Tumbi' AM/ANOS 2006

Dendrobium aemulum 'Sidney'

Dendrobium Waverley Imp



Pterostylis curta

Dendrobium Gowan's Tangello 'Susan'

Dendrobium Stunning 'Extremely'

Dendrobium Gundy Moon 'Bursting'

Dendrobium Tamara 'JD Spots'

Best Species Seedling was *Dendrobium speciosum* ('Lyrebird' x '97 Albino') grown by Jody Cutajar.

Best Species Seedling was *Dendrobium* Wild Thing grown by Richard & Gaewyn Hurst.

Champion Australasian was *Dendrobium* Waverley Imp grown by Neville Lee.

Champion Terrestrial was *Pterostylis curta* grown by Grahame Young.

Champion Specimen was *Dendrobium* Jesmond Star 'Melissa' grown by Grahame Young.

Manager's Choice was *Dendrobium tetragonum* var. *melaleucaphilum* grown by Nicholas Watts.

ANOS Kabi Group 17th Spring Show 2022

Text and Photos by Callyn Farrell | callynfarrell@gmail.com

ANOS Kabi Group has held an annual spring show for 17 years and hosted the ANOS National Conference and Show twice since 2013 combined with the show. For Australasian orchid enthusiasts throughout Queensland and the northern part of New South Wales, the show provides vital access to orchid knowledge and orchid-based social connections. Further, it has offered access to the latest linebreeding of *Dendrobium speciosum* and complex hybrids using this species by life members Ross and Rhonda Harvey, formerly Cedarvale Orchids. The show is a base for a large panel of ANOS judges, facilitating training and practice.

The venue for the 2022 show was changed from the group's long-term venue in the northern Brisbane suburb of Strathpine to the Albany Creek Community Centre, however, the success of the show was not affected. As with several ANOS groups over the past decade, venue changes have been common. When forced to adapt, the Kabi group showed resilience and motivation to produce positive outcomes for their membership and the general public.

The 2022 spring show was well supported by members, with around 200 plants benched. I have been a member since 2016, and exceptional exhibits of *Dendrobium speciosum* have dominated our spring shows. Interestingly, this year saw a marked increase in entries in the *Dendrobium* hybrid classes. This was likely due to a long, dark winter in the Brisbane area, and the show being held one week earlier than usual. It demonstrates a recent trend throughout Australian orchid hobby groups - individuals are growing more complex *Dendrobium* hybrids and to a higher standard. This inspires growers and breeders and attracts new members, which may be due in part to the greater range of floral colours and flower shapes.

The group can be commended on the culture it promotes within its membership which values friendship, positive discussion, the volunteering of knowledge and time, and the promotion of Australasian orchids. This is supported by a strong committee, a large active membership, and importantly, new members.

In addition to the show, the group ran a popular raffle and a very successful café that were supported by members, judges, and the public. The vendors offered the opportunity for everyone in attendance to add to their collections. Members communicated cultural and historical knowledge to those new to orchid growing and people who wished to learn more. The show is a good opportunity for ANOS judges to expand their knowledge and have in-depth conversations regarding the exhibits.

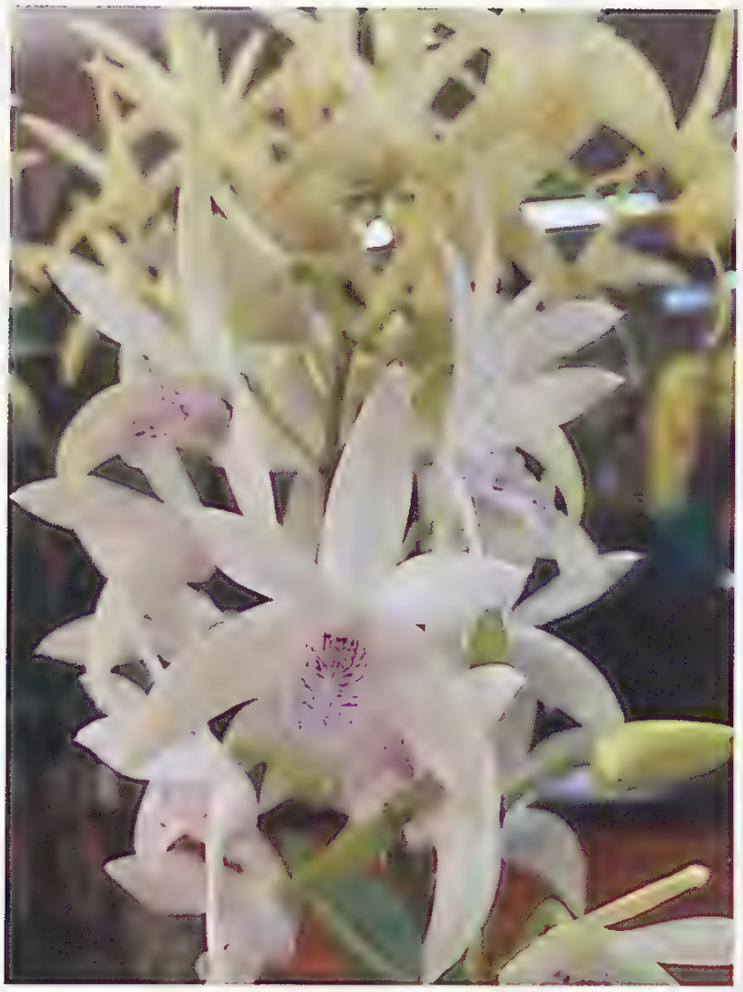
A large number of *D.* Greta Snow plants were benched. These hybrids have long provided a talking point at Kabi shows, mainly due to Ross and Rhonda Harvey, who have consistently grown this grex outstandingly. The plants filled two tables and caught the eye of many visitors. It was interesting to see the next generation of this line of breeding displayed, *D.* Samford Snow. It retains the same floral qualities of *D.* Greta Snow, such as size, shape, and colour, but tends to exhibit improved presentation, flower count, substance and texture. The Champion Hybrid of the show, *D.* Samford Snow 'Samford Serene', demonstrated positive improvements.

It was impressive to see a large number of *Dendrobium* sect. *Rhizobium* hybrids and species exhibited. This section of *Dendrobium* has been growing in popularity but rarely have we seen large and well-flowered plants displayed. To ensure the judging of this class was not overtaxing, the show marshal decided to create two classes for

Kabi show benches

A record number of hybrids were benched.

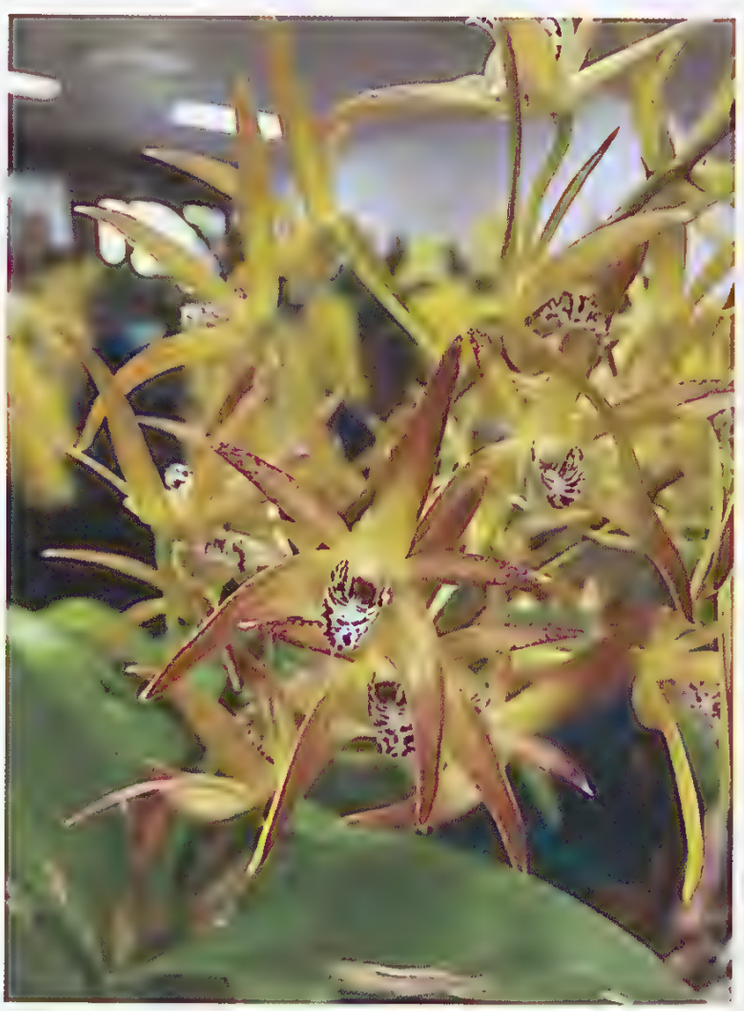
Dendrobium Greta Snow 'Samford Serene'



Dendrobium Bergen

Dendrobium Sunglow 'Tumbi'

Dendrobium Amphion Aglaea



Dendrobium Wild Thing

Dendrobium Freckles 'Best Blue' AM/AOC

Dendrobium sect. *Rhizobium* hybrids based on colour. The first included brown and purple tones, while the second included yellow and green. Such flexible approaches to changing a show schedule on the day encourage exhibitors to bring along more plants, which benefits the show. They also aid judges in making decisions by grouping plants that look somewhat similar.

Show Results

Champion Hybrid was *Dendrobium* Samford Snow 'Samford Serene' grown by Ross and Rhonda Harvey.

Champion Species was *Dendrobium speciosum* var. *grandiflorum* 'Jelita' x *Dendrobium speciosum* var. *curvicaule* 'Daylight Moon' grown by Bruce Vayro.

Champion Specimen was *Dendrobium teretifolium* var. *teretifolium* 'Palmy Mist' grown by Ian Brown.

Dendrobium Royal Wings

#411 *Dendrobium bigibbum* 'Mia' HCC/ANOS 2022 (QLD)

Points	79.0
Owner	Chris & Lorna Duffy
Date & Event	12 April 2022
Photos By	Graham Corbin
#Flowers/influorescences	301 and 89 buds / 26 (3 all buds)
Measurements (mm):	
Flower: across 57, vert. 44 Petal: 29L, 33W Sepal: 27L, 13W	Dorsal: 22L, 14W Labellum: 24L, 16W Inflorescence Length: 530
Detailed avg. points:	
Shape (25): 20 Colour (20): 16.1 Size (15): 11.5	Substance/Texture (10): 7.3 Floriferousness (15): 11.6 Habit/Attractive (15): 12.3

412 *Dendrobium bigibbum* 'Mia' ACC/ANOS 2022 (QLD)

Points	77.5
Owner	Chris & Lorna Duffy
Date & Event	12 April 2022
Photos By	Graham Corbin
#Flowers/influorescences	301 and 89 buds / 26 (3 all buds)
Measurements (mm):	
Flower: across 57, vert. 44 Petal: 29L, 33W Sepal: 27L, 13W	Dorsal: 22L, 14W Labellum: 24L, 16W Inflorescence Length: 530
Detailed avg. points:	
Shape (25): Colour (20): Size (15):	Substance/Texture (10): Floriferousness (15): Habit/Attractive (15):

Royal Botanic Gardens Victoria
RBG00023198

ANOS Groups and Societies

Current contact details can be found at **anos.org.au** or in the individual group website.

Queensland

ANOS Beenleigh Inc.
ANOS Kabi Inc.(Brisbane)
ANOS Mackay and District
ANOS Townsville Inc.
Native Orchid Society of Toowoomba Inc.

New South Wales

ANOS Central Coast
ANOS Far North Coast Inc.
ANOS Illawarra
ANOS Macarthur and District
ANOS Mid-North Coast
ANOS Newcastle Inc.
ANOS Sydney Inc.
ANOS Warringah Inc.

Victoria

ANOS Geelong Inc.
ANOS Melbourne Suburbs Group Inc.
ANOS Victoria Inc.

South Australia

Native Orchid Society of South Australia Inc.

Western Australia

ANOS Western Australia Inc.

New Zealand

ANOS New Zealand Native Orchid Group

Thelymitra apiculata. Photo Alix Matt